THE NATIONAL ACADEMY OF SCIENCE ICEBREAKER REPORT

(109–99)

HEARING

BEFORE THE

SUBCOMMITTEE ON
COAST GUARD AND MARITIME TRANSPORTATION

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

SEPTEMBER 26, 2006

Printed for the use of the
Committee on Transportation and Infrastructure

U.S. GOVERNMENT PRINTING OFFICE

30–669 PDF WASHINGTON : 2007

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

DON YOUNG, Alaska, *Chairman*

THOMAS E. PETRI, Wisconsin, *Vice-Chair*
SHERWOOD L. BOEHLERT, New York
HOWARD COBLE, North Carolina
JOHN J. DUNCAN, JR., Tennessee
WAYNE T. GILCHREST, Maryland
JOHN L. MICA, Florida
PETER HOEKSTRA, Michigan
VERNON J. EHLERS, Michigan
SPENCER BACHUS, Alabama
STEVEN C. LATOURETTE, Ohio
SUE W. KELLY, New York
RICHARD H. BAKER, Louisiana
ROBERT W. NEY, Ohio
FRANK A. LOBIONDO, New Jersey
JERRY MORAN, Kansas
GARY G. MILLER, California
ROBIN HAYES, North Carolina
ROB SIMMONS, Connecticut
HENRY E. BROWN, JR., South Carolina
TIMOTHY V. JOHNSON, Illinois
TODD RUSSELL PLATTS, Pennsylvania
SAM GRAVES, Missouri
MARK R. KENNEDY, Minnesota
BILL SHUSTER, Pennsylvania
JOHN BOOZMAN, Arkansas
JIM GERLACH, Pennsylvania
MARIO DIAZ-BALART, Florida
JON C. PORTER, Nevada
TOM OSBORNE, Nebraska
KENNY MARCHANT, Texas
MICHAEL E. SODREL, Indiana
CHARLES W. DENT, Pennsylvania
TED POE, Texas
DAVID G. REICHERT, Washington
CONNIE MACK, Florida
JOHN R. 'RANDY' KUHL, JR., New York
LUIS G. FORTUÑO, Puerto Rico
LYNN A. WESTMORELAND, Georgia
CHARLES W. BOUSTANY, JR., Louisiana
JEAN SCHMIDT, Ohio

JAMES L. OBERSTAR, Minnesota
NICK J. RAHALL, II, West Virginia
PETER A. DEFAZIO, Oregon
JERRY F. COSTELLO, Illinois
ELEANOR HOLMES NORTON, District of Columbia
JERROLD NADLER, New York
CORRINE BROWN, Florida
BOB FILNER, California
EDDIE BERNICE JOHNSON, Texas
GENE TAYLOR, Mississippi
JUANITA MILLENDER-MCDONALD, California
ELIJAH E. CUMMINGS, Maryland
EARL BLUMENAUER, Oregon
ELLEN O. TAUSCHER, California
BILL PASCRELL, JR., New Jersey
LEONARD L. BOSWELL, Iowa
TIM HOLDEN, Pennsylvania
BRIAN BAIRD, Washington
SHELLEY BERKLEY, Nevada
JIM MATHESON, Utah
MICHAEL M. HONDA, California
RICK LARSEN, Washington
MICHAEL E. CAPUANO, Massachusetts
ANTHONY D. WEINER, New York
JULIA CARSON, Indiana
TIMOTHY H. BISHOP, New York
MICHAEL H. MICHAUD, Maine
LINCOLN DAVIS, Tennessee
BEN CHANDLER, Kentucky
BRIAN HIGGINS, New York
RUSS CARNAHAN, Missouri
ALLYSON Y. SCHWARTZ, Pennsylvania
JOHN T. SALAZAR, Colorado
JOHN BARROW, Georgia

SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION

FRANK A. LOBIONDO, New Jersey, Chairman

HOWARD COBLE, North Carolina
WAYNE T. GILCHREST, Maryland
PETER HOEKSTRA, Michigan
ROB SIMMONS, Connecticut
MARIO DIAZ-BALART, Florida
DAVID G. REICHERT, Washington,*Vice-Chair*
CONNIE MACK, Florida
LUIS G. FORTUÑO, Puerto Rico
CHARLES W. BOUSTANY, JR., Louisiana
DON YOUNG, Alaska
(Ex Officio)

BOB FILNER, California, Ranking Democrat
CORRINE BROWN, Florida
GENE TAYLOR, Mississippi
JUANITA MILLENDER-MCDONALD, California
MICHAEL M. HONDA, California
ANTHONY D. WEINER, New York
BRIAN HIGGINS, New York
BRIAN BAIRD, Washington
JAMES L. OBERSTAR, Minnesota
(Ex Officio)

CONTENTS

TESTIMONY

PREPARED STATEMENTS SUBMITTED BY MEMBERS OF CONGRESS

PREPARED STATEMENTS SUBMITTED BY WITNESSES

SUBMISSION FOR THE RECORD

THE NATIONAL ACADEMY OF SCIENCE ICEBREAKER REPORT

Tuesday, September 26, 2006,

HOUSE OF REPRESENTATIVES, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION, WASHINGTON, D.C.

The subcommittee met, pursuant to call, at 1:05 p.m., in room 2167, Rayburn House Office Building, the Honorable Frank A. LoBiondo [Chairman of the subcommittee] presiding.

Mr. YOUNG. [Presiding] The Committee will come to order.

I do apologize to my Chairman, but he is not here right now and because my time is short, we are going to go ahead and start this fine testimony about icebreakers.

I would like to welcome the witnesses: Mr. Mead Treadwell, an Alaskan, Dr. Bement, Rear Admiral Nimmich, and Dr. Jones. Welcome to the hearing.

Personally, I will have to tell you I am extremely interested in the icebreakers, where they are stationed, what is the future, what are our plans, primarily because of the "global warming." With all the negativism that is occurring, we also have to look at the positive side that there is a strong possibility that the northern part of our hemisphere will be connected with the European continent via water for year-round trade and traffic which would be a tremendous asset because we would be able to move product without the expenditure of fossil fuel which now occurs. In fact, it will be a bit shorter to the two greatest markets in the world which would be Russia and the United States. I am very much interested in what you have to present to me today.

Again, I am a little bit concerned about the diminishing role. I would like to promote the role of icebreakers instead of diminishing the role, and I try to encourage the people in the Administration to understand that there is a future to look at, and we must not be dependent upon just other countries. We have to be deeply involved in the icebreaking capability.

With that, I would like to call Dr. Jones to be the first witness. Doctor, again, welcome.

TESTIMONY OF ANITA K. JONES, CHAIR, POLAR RESEARCH BOARD, COMMITTEE TO ASSESS U.S. COAST GUARD POLAR ICEBREAKER ROLES AND FUTURE NEEDS, THE NATIONAL ACADEMIES; REAR ADMIRAL JOSEPH L. NIMMICH, ASSISTANT COMMANDANT FOR POLICY AND PLANNING, UNITED STATES COAST GUARD; ARDEN L. BEMENT, JR., DIRECTOR, NATIONAL SCIENCE FOUNDATION; MEAD TREADWELL, CHAIRMAN, U.S. ARCTIC RESEARCH COMMISSION

Ms. JONES. Thank you. Good afternoon, Congressman Young, members of the Subcommittee, and staff. Thank you for inviting me to speak to you today about the current and future roles of the U.S. Coast Guard icebreaking operations and to explain the importance of the capability to the national needs.

My name is Anita Jones. I serve as the Chair of the National Academies' Committee to Assess U.S. Coast Guard Polar Icebreaker Roles and Future Needs. Our committee was asked to provide a comprehensive assessment of polar icebreaker missions, how these missions might change over time, and how we can reliably meet all national needs, given the state of our icebreaker fleet.

First, I will summarize our findings and conclusions of the just completed study. The U.S. Coast Guard Polar Icebreaker Fleet has substantially diminished capability. The committee finds that the national strategic interests require that the Nation renew that fleet to be able to operate in both polar regions reliably and at will. We find that the Nation continues to need to have the capability to project an active influential presence for different reasons in the two polar regions. That need is growing in the Arctic. The Nation should continue to be a leader in polar region research.

The icebreaker fleet needs to be renewed by building two new ships, a transition from the current diminished capability to a robust icebreaking capability should be planned. The U.S. Coast Guard should be budgeted to operate and maintain this multi-mission fleet. Lastly, a Presidential decision directive should be issued to reassert our interests, to clearly state what has changed, and to clearly align agency responsibility and budgetary authorities.

Now, I would like to elaborate on just a few of these issues. Again, to achieve the national purposes, the Nation needs to be able to access various sites at different times of the year reliably and at will, and that assured access requires icebreaking ships capable of operating in challenging ice conditions. Over the past couple of decades, the Government has deployed a fleet of four icebreakers and three multi-mission ships operated by the Coast Guard. By multi-mission, I mean that they support the conduct of science as well as the missions of the Coast Guard, Homeland Security, maritime safety, national security, and protection of natural resources. In addition, the National Science Foundation operates a single mission ship that is solely dedicated to scientific research.

Today, two of the multi-mission ships, the Polar Star and the Polar Sea, are at the end of their service life, 30 years. Deferred maintenance, absence of an upgrade program to extend their lifetime, and lack of replacement has left the U.S. with a multi-mission fleet of one ship, and the U.S. is at risk of being unable to meet its interests in the polar region, particularly in the Arctic. In the Arctic, the ice pack has thinned and retreated dramatically.

This committee anticipates greater human presence in the Arctic with increased economic activity, as you alluded to. Oil companies have purchased a large number of leases in the sea and on the land of the Alaskan North Slope. Adventure travel to the North increases. The number of ice-strengthened tankers in the world will shortly double, incurring new traffic across the north of Russia and through the Bering Strait, we expect. Mining will be more cost-effective in Northern Alaska as ice retreat allows longer periods to load ore ships.

Greater human activity will increase the need for the Coast Guard to assert a more active and influential presence in the Arctic to protect the Nation's economic, scientific, environmental, and foreign policy interests. This requires the use of icebreakers. The retreat of the sea margin is not uniform or predictable. Conditions may become more or less difficult. In our conversations with the Coast Guard, they have told us that they consider this their mission and actually look forward to it.

The many needs that are documented in our report lead the committee to conclude that the Nation requires a multi-mission fleet. From a national point of view, from a national policy point of view, the Coast Guard missions transcend the support of science, but science missions are quite complementary. This has been demonstrated admirably both with science missions on the Healy and McMurdo break-ins using the Polar Sea and the Polar Star.

While McMurdo break-in does not have to be performed by a military service, the break-in does require a reliably controlled ship. This committee concluded that that means U.S.-owned, U.S.-operated, and U.S.-flagged. However, performing McMurdo break-in is compatible with the other demands on the multi-mission Coast Guard fleet, and the committee notes that a Coast Guard asserts a tangible U.S. presence; a leased ship does not.

So, from the total fleet perspective, the committee believes that the Coast Guard should operate this multi-mission fleet, that it should be provided sufficient resources and maintenance budget to support an increased regular and influential presence in the Arctic. The committee believes that it will be cost-effective to the Nation if the science users reimburse incremental costs associated with directed mission tasking, a relationship that has worked very well in the past.

Our report documents why we recommend new ship construction rather than upgrading existing ships, and we document the need for two new icebreakers, not one and not zero. These ships would be deployed solo and in concert for science missions, including going into the North Pole area and the deep Antarctic ice, logistics resupply to McMurdo, undersea continental shelf mapping to either support or refute territorial claims in the Arctic, command in case of a petroleum spill situation, search and rescue, economic activity, and more. With three ships, simultaneous deployment in both polar regions is possible, even in heavy ice conditions.

This committee believes that the U.S. Coast Guard should reestablish a regular active patrol presence in the Arctic waters to meet statutory responsibilities that inevitably derive from increased human activity. A single ship will not assert the presence

and will not allow us to go reliably and at will where we need to go.

The report details how we would transition to those new ships. Our capabilities have diminished. We would rely on the Polar Sea being kept mission-capable until new ships come in with the Polar Star in caretaker status. In conclusion, Congressman Young, the Nation has a problem. Diminished polar icebreaking capability at a time when new and vital demands for such missions are rising in the Arctic. Funding has been less than adequate over recent years. Funding has been recently moved between agencies. Either Congress or the Administration or both needs to address this problem. In our report in our recommendations, we offer what we believe is an appropriate solution.

Finally, the committee recommends that a Presidential decision directive be issued to reassert U.S. interests in the polar regions, to assert that polar icebreakers are essential instruments of U.S. National Policy and to clearly align agency responsibilities and budgetary authorities.

Thank you, sir.

Mr. YOUNG. Thank you, Doctor, and may I compliment you and the committee on the report. We asked for this report. If it had been the other way around, I probably wouldn't be complimenting you.

[Laughter.]

Mr. YOUNG. It reinstates what I have said publicly and privately to the Administration, the importance of this mission. I did encourage you. The committee was freestanding. I just like what I have read and what has been recommended, and I hope that somewhere along the line that Congress will wake up to the importance of this for the future.

Admiral?

Admiral NIMMICH. Chairman Young, distinguished members of the Committee, thank you for this opportunity to discuss the Coast Guard polar icebreaking mission.

Mr. Chairman, the Coast Guard can trace its polar icebreaking roots at least back to 1867 when President Andrew Johnson dispatched one of our cutters to research and chart the coastal waters of the 30,000 miles of Alaskan coastline and simultaneously enforce laws and ensure the safety of the new Americans in the newly acquired territory. We accompanied Admiral Byrd's expedition to the South Pole and for many years ran parallel icebreaking fleets with the United States Navy.

In 1967, President Lyndon Johnson directed all of the Federal icebreaking resources be turned over to the Coast Guard to operate on behalf of the entire United States Government. The role was reaffirmed in 1990, a Presidential declaration, and validated more recently by the 1999 roles and mission study of the U.S. Coast Guard.

The national requirements for polar icebreaking capability that the Coast Guard has historically provided fall into three distinct but equally important performance classifications: direct mission tasking or scientific support; traditional Coast Guard mission executions, search and rescue, and environmental protection; and sovereign national presence and force protection. The Coast Guard's

polar program, embodied in these three areas, has afforded the United States the opportunity to operate in both polar regions, making a prominent contribution to the continued and expanded national interest in these remote regions.

This presence is especially vital, given the projections for expanded shipping and commerce in the Arctic. The National Research Council report and the related research suggest 25 percent of the world's energy reserves lie above the Arctic Circle. Similarly, the number of offerings of Arctic excursions indicating tremendous growth in the ecotourism in this remote area. Ensuring safety of our citizens, security of our Nation, and the stewardship of our national resources will require a combination of icebreaking capability and enforcement authorities.

If on review of the National Research Council's report, the Administration and Congress decide a Federal polar icebreaking program is in the best interest of the United States and further decide that the Coast Guard should manage the execution of the mission, consistent with our current authorities, we are prepared to do so. We will continue in smart fashion to meet every operational mission requirement as we have since 1964 when all of the polar icebreaking assets were entrusted to our care.

Our resolve is to provide the safety, security, and stewardship throughout the entire national maritime domain and advance our Nation's maritime interests including those in the polar regions. The Coast Guard will continue to partner closely with the National Science Foundation to support future scientific activities to the fullest extent possible while simultaneously affording the Nation our full and considerable range of capabilities as well as sovereign value of a military vessel of the United States.

Like you, we have just received the report of the National Research Council, and we look forward to discussing their recommendations and working towards important national outcomes.

Thank you for the opportunity to provide this testimony. I ask that you allow my full written statement to be entered into the record, and I look forward to answering any questions you may have.

Thank you, Mr. Chairman.

Mr. YOUNG. Thank you, Admiral, good presentation.

Dr. Bement? It is my understanding, though, Dr. Treadwell and Dr. Bement both have a testimony at 3:00 on the Senate side. OK; that is one reason I started this.

For your information, we do have a vote on, and none of you really care about this vote. But Mr. Treadwell, will you go back home and tell them I am doing the work, so you don't have to sit here and do nothing for hours and hours. I am going to miss this vote because I think this is more important. Icebreakers are more important than voting on the Minority's motion to resolve into a secret session. I thought we were for open Government, for goodness sakes.

Yes, sir?

Mr. FILNER. Reserving the right to object.

[Laughter.]

Mr. YOUNG. Dr. Bement, please.

Mr. BEMENT. Thank you, Chairman Young and Ranking Member Filner. I am pleased to appear before this Subcommittee for the first time to speak on behalf of the National Science Foundation.

NSF is an extraordinary agency with an equally extraordinary mission of enabling discovery, supporting education, and driving innovation, all in the service of society and the Nation. In addition, the Foundation has been tasked with chairing the Interagency Arctic Research Policy Committee created under Federal statute to coordinate Arctic research sponsored by Federal agencies. NSF also manages the U.S. Antarctic Program on behalf of the U.S. Government as directed by Presidential Memorandum 6646 issued in 1982.

The Arctic and Antarctic are premier natural laboratories. Their extreme environments and geographically unique settings permit research on fundamental phenomena and processes not feasible elsewhere. Polar research depends heavily on ships capable of operating in ice-covered regions. They serve as research platforms in the Arctic and southern oceans and as key components of the logistics chain supporting on-continent research in Antarctica. As a principal source of U.S. support for fundamental research in these regions, NSF is the primary customer of polar icebreaker and ice-strengthened vessel services for scientific research purposes.

NSF's responsibilities take somewhat different forms in the Arctic and in the Antarctic. My written testimony explains in detail how icebreaker requirements differ in each region, but in both cases, the question of how best to meet these responsibilities boils down to consideration of three factors: cost, performance, and policy.

With respect to support for Arctic research, the Healy is a capable and relatively new ship, but current Coast Guard practices governing its use and operating costs put limitations on its effectiveness as an Arctic research platform. For example, current deployment standards allow Healy to spend only 200 days at sea annually, averaging 100 days less than her international partners. Additionally, the Healy costs roughly $100,000 per day at sea, and in contrast, the lease price to NSF of the Louis St. Laurent, Canada's largest icebreaker is $35,000 per day. As I have already stated, the Healy is a capable ship. If she could be operated more efficiently, she would be of even more value to the research community.

Antarctic ship-based research and Palmer Station resupply depend primarily on two privately owned vessels: the Laurence M. Gould and the Nathanial B. Palmer. These ships are well-equipped for their mission and they operate at sea more than 300 days annually at a daily rate of roughly $24,000 and $54,000 respectively.

The operation of McMurdo and South Pole Stations require the annual delivery of fuel and supplies by sea. To fulfill this requirement, NSF has long depended on the U.S. Coast Guard Polar Sea and Polar Star to break out the thick ice in McMurdo Sound. As these two ships are at, or close to, the end of their service life, however, these national assets have become extremely expensive to maintain and operate. In just the past two years alone, NSF has spent roughly $20 million on extraordinary maintenance. It is clear that the polar icebreakers are a fragile resource that could jeopard-

ize the critical foreign policy and scientific objectives in the Antarctic.

The overriding question is how to open the channel to McMurdo Station so that year-round operation of the Nation's McMurdo and South Pole Stations. This year-round occupation is central to demonstrating the active and influential presence which is a cornerstone of U.S. policy in Antarctica. As noted in the National Academy report, meeting this requirement is a significant national challenge.

Accordingly, and after consultations with officials in OSTP and OMB, I wrote on May 31st, 2006, to Dr. Jones in her role as Chair of the NRC icebreaker study, as follows: Given the rapidly escalating costs of Government providers for icebreaking services and the uncertain availability of U.S. Coast Guard icebreakers beyond the next two years, it is NSF's intention to seek competitive bids for icebreaking services that support the broad goals of the U.S. Arctic Program. This competition would be open to commercial, Government, and international service providers.

Mr. Chairman, NSF's commitment to polar research as well as its responsibility to manage the U.S. Antarctic Program are unchanging. We only seek the flexibility to do so in the most cost-effective manner possible. We are pleased to see that, in broad terms, the NRC study released today recognizes our constraints.

I appreciate the opportunity to appear before the Subcommittee, and I would be pleased to answer any questions you may have. Thank you.

Mr. YOUNG. Mr. Treadwell, a good Alaskan, would you present your testimony?

Mr. TREADWELL. Chairman Young, Chairman LoBiondo, thank you for the opportunity to testify before the Subcommittee.

My name is Mead Treadwell. I am from Anchorage, Alaska. I have been a member of the Arctic Research Commission since 2001, and this is my first testimony as the Chair of the commission, designated by the President earlier this summer. I also serve and I am delighted to serve with Dr. Bement who chairs the Interagency Arctic Research Policy Committee which our commission works closely with in formulating Arctic policy.

I should also state that while I am appointed by the President, my remarks have not been cleared by the Office of Management and Budget.

Also, I would just like to dedicate my remarks to two crew members of the Coast Guard icebreaker Healy who died this summer in the conduct of Arctic research and to their families. Lieutenant Jessica Hill and Steven Duque, both divers, should be remembered for the contribution and sacrifice they made in the quest for Arctic knowledge.

As far as this study, the commission worked with the Committee as you sought this study and worked with the Academy to see it happen, the National Research Council. As the report has just been publicly released, we will require more time to study it ourselves. Based on our preliminary understanding, the Arctic Research Commission supports its conclusions, especially one, the need to continue to lead in polar research and two, the need to begin now to

replace the polar class vessels for all of the reasons that were given in the report.

The United States has been a polar country since 1867, and we are a leading nation in Arctic research. With respect to icebreakers and the Federal icebreaking mission, we work with other agencies to make sure that these icebreaker platforms can be used for research, and we have also worked with the agencies and the Congress to make sure that the future of Arctic shipping, as it is changing, is considered. Just in the way of that, Mr. Chairman, the Commission sponsored a report called the Arctic Marine Transport Workshop. It was a report done a few years ago, looking at the potential future of shipping in the Arctic which you alluded to. We also co-sponsored a report called Advancing Oil Spill Response in Ice-Covered Waters, both of which reflect this today.

The statute that sets up our commission as well as the Interagency Arctic Research Policy Committee says that the Office of Management and Budget shall seek to facilitate planning for the design, procurement, maintenance, deployment, and operations of icebreakers needed to provide a platform for Arctic research by allocating all funds necessary to support icebreaking operations, except for recurring incremental costs associated with specific projects, to the Coast Guard.

Mr. Chairman, this report takes issue with a recent decision by OMB to shift funding to NSF and, in fact, argues that incremental costs should be borne by the science community or other communities and that the main costs should go back to the Coast Guard. I think one of the most important conclusions of this is that a Presidential decision document on icebreakers ought to be considered here as there hasn't been one for many years, almost two decades, and that we ought to really seriously look at this issue of how icebreakers and icebreaker operations are funded.

While scientific research may be our particular purview, we also recognize that a fleet of icebreakers is a vital part of the Nation's strategic presence in the polar regions. Climate change is presenting both challenges and opportunities such as improved prospects for research, enhanced access to natural resources, and favorable circumstances for marine transportation. One thing this report points out, Mr. Chairman, is that it is not just climate change that is making the Arctic Ocean more accessible; it is technology. In fact, one of the reasons why the National Research Council recommended building new icebreakers as opposed to refurbishing the two that we have is because of the dramatic changes in the technology that other vessels such as commercial vessels will already be using.

Attached to my written testimony is a letter the Commission sent to the President last year on icebreakers, but we have four specific points. One, these icebreakers are vital for scientific research. If the U.S. is to continue to lead, we need this icebreaking capability and shouldn't a Federal icebreaking fleet be supporting our research and polar interests.

Second, the icebreakers maintain our national presence in both the Arctic and the Antarctic. We are hearing a lot from Canada's Prime Minister about sovereignty issues in the North. We are working with the State Department to try to develop a better map-

ping program for our potential claims outside the 200-mile limit there, and we need icebreaker platforms to get there. We also have a growing need for an oil spill response system in the Arctic, which requires icebreaker support.

Third, marine access and shipping are increasing. We are going to see a large part of America's oil supply come out of the Arctic in the years to come. As Arctic sea ice disappears, marine access will open up. Mr. Chairman, you and I have had discussions. The cost of a few icebreakers is very small compared to building a new Panama Canal or building a Suez Canal, and having the icebreaker capability to support commerce ultimately is a low cost relatively for the Country.

Finally, as I mentioned before, claims to extend U.S. sovereignty in the Arctic is another point the Commission has made. Whether or not the U.S. accedes to the Convention on the Law of the Sea, we must conduct surveys of our Nation's extended continental shelf in order to support our claims of sovereignty, and there is no other platform that can do this. We have looked at the submarines, and they can be very, very helpful, but we need the icebreaker platforms to make this go.

With that, I will conclude, but I want to underscore the issue which Chairman Bement brought to you, that the daily operational cost of $100,000 for the Healy puts science and scientists in a bind. I think we need to look at these funding issues and the costs and try to balance the costs of these missions and the other factors, and I believe that is why the National Research Council report needs to be dealt with fairly quickly.

Mr. YOUNG. I want to thank the panel.

Dr. Bement, under the present proposal and actually last year's activity, how much money did you transfer to the Coast Guard for Coast Guard icebreaker maintenance and improvement?

Mr. BEMENT. Well, in Fiscal Year 2006, we received $47 million from the Coast Guard under transfer in order to fulfill total O and M requirements.

Mr. YOUNG. Pardon me; the Coast Guard received $47 million?

Mr. BEMENT. We received that from the Coast Guard.

Mr. YOUNG. Wait a minute; the Coast Guard, you gave them the money?

Admiral NIMMICH. Sir, in the 2006 appropriations, the base transfer of 47, almost $48 million went out of the Coast Guard's budget into NSF's budget with their agreement that NSF then would repay.

Mr. YOUNG. That is what I wanted; 48. Now, Doctor, how much was transferred back to Coast Guard for maintenance of the cutters?

Mr. BEMENT. Close to $55 million.

Mr. YOUNG. Fifty-five, is that correct, Admiral?

Admiral NIMMICH. To date, $51.9 million has transferred with a commitment up to about $54 million in 2006, and 2007, the commitment is to $57 million. But what I would point out, Mr. Chairman, is that the base transfer that went over didn't include the normal non-recurring funding that NSF would send back to the Coast Guard. So we are pretty much at a zero sum game at this point in time, sir.

Mr. YOUNG. The Coast Guard?

Admiral NIMMICH. Yes, sir.

Mr. YOUNG. Now, Doctor, the other thing is how much did you pay the Russian sub that broke down for the Antarctica icebreaker?

Mr. BEMENT. You are talking about this past year?

Mr. YOUNG. Yes.

Mr. BEMENT. Where the Russian icebreaker broke a blade ff the stern?

Mr. YOUNG. Yes.

Mr. BEMENT. Just a moment; the total cost, I can't give you the exact cost to repair the blade of the ship, but the total cost of commissioning that ship was $8 million.

Mr. YOUNG. Eight million; what was the yearly contract, $8 million, or what was the yearly contract for that icebreaker?

Mr. BEMENT. We don't have an annual contract. We only contracted for the time that we were actually using the ship in the Antarctic, and that was $8 million.

Mr. YOUNG. Well, what I am leading up to is if the Healy is not operative and the Polar Star, if you go out, as you mentioned in your testimony, you are going out to fulfill the science research. You are going out and actually leasing or contracting to a foreign country, not U.S.-flagged, icebreaking capability, what are your estimates of expenditures?

Mr. BEMENT. Generally speaking, our experience in leasing icebreaker services from foreign ships is about anywhere from $6 million to $8 million a year because they only operate during the time that they are required. Our memorandum of agreement with the Coast Guard is that we pay total annual costs for operation and maintenance, total crew costs, and those costs can be a size I indicated, including unusual maintenance costs.

Mr. YOUNG. Again, I might have read it. But I do believe before I can cast any stones which I very rarely do because this uses ballast usually on my watch, to my whiner, excuse me, Mr. Filner.

Doctor, my interest, of course, is having American-flagged icebreakers for not only research which is the thing now, but as that research occurs, I think we ought to have these American-flagged icebreakers for commerce, and that is our responsibility. We have to decide in this Congress. If we don't have them American-flagged, then it goes to somebody else.

I just talked to my staffer here, and I will talk to you, Mr. Filner. I think we ought to have Filner Young and Rayfield Icebreakers, Incorporated. We may not see much of it, but our great grandkids probably would be multi-billionaires. That is the next highway.

Mr. BEMENT. Mr. Chairman?

Mr. YOUNG. Yes.

Mr. BEMENT. I am fully in agreement with your goal and fully support it. We have worked with the Coast Guard for over four decades, and the Coast Guard has fulfilled their mission with distinction over that period of time. So we have a very close working relationship. But the issue we are dealing with very fragile resources at this point that are very expensive to maintain.

Mr. YOUNG. We need to get you more money.

Mr. BEMENT. Yes.

Mr. YOUNG. That solves the problem.

Mr. BEMENT. That is right. The point is we also have a requirement under Presidential memorandum that we should operate in the most cost-effective way. So we have this dichotomy.

Furthermore, it is very risky to operate with a single icebreaker because there can be breakdowns. So you always have to consider having a backup ship.

Mr. YOUNG. You need three or four?

Mr. BEMENT. Well, we need two.

Mr. YOUNG. We need three or four.

Mr. BEMENT. Oh, well, if you are talking about-

Mr. YOUNG. I am not much interested in the Antarctic, but I am more interested in the Arctic.

Mr. BEMENT. I totally agree with the NRC report, and if you are talking about what the fleet size should be, I would agree.

Mr. YOUNG. Again, I thank the staff.

Mr. Chairman, would you mind sitting in my warm seat for a while? I will have to leave you right now.

Mr. LOBIONDO. [Presiding] Mr. Filner?

Mr. FILNER. I thank the Chair.

Mr. LOBIONDO. You are up.

Mr. FILNER. I am sorry. I thank Mr. Young for being here.

I was going to ask him why they would need the icebreakers in his area since the liberal plot of global warming may alleviate the needs. I am glad you all accept it. The way I heard your testimony, climate change, global warming is a fact much as some people like to think it is a political something or other. I think the evidence is clear on that. Sometime I would like to see some projects of what that means for some of the things we are talking about today.

Admiral, I though we had Admiral Nimitz here, and I was prepared to be very——

Admiral NIMMICH. No relation, sir.

Mr. FILNER. Admiral Nimmich, right?

Nimitz is very important to San Diego where I come from.

I think Chairman Young talked about the basic necessity of money, and I think we would agree on that. Do you have any estimate for building two more polar icebreakers?

Admiral NIMMICH. Yes, sir; both the Coast Guard and the National Science Academy have indicated that it would be at least $600 million to $700 million per icebreaker, so about $1.4 billion, sir.

Mr. FILNER. Now, given the commitment of the Coast Guard to deepwater, do you see any way that the Coast Guard could build those over the next decade or so?

Admiral NIMMICH. No, sir; the polar icebreakers are not part of the deepwater acquisitions, sir. So any desire to build a new fleet would require additional assets over the deepwater.

Mr. FILNER. How many days, do you know, per year is the current fleet used for such things as law enforcement or oil spills? Do you have a number on that?

Admiral NIMMICH. Sir, they are primarily used right now for scientific research. We are indicating the expanding role in the Arctic. The number of ecotours that you could Google, Arctic adventures on the web, you would find pages and pages of opportunities to go into the Arctic, creating a safety risk. The leases for exploratory

drilling in the Arctic Region have all been released and sold. The expanding nature up there would require the additional capabilities of Coast Guard icebreakers, sir.

Mr. FILNER. The need for additional is clear to you, given those needs?

Admiral NIMMICH. Sir, for the Nation to meet their expectations in the Arctic and Antarctic, the current suite of icebreakers are not adequate.

Mr. FILNER. By the way, it slipped my mind with the research you mentioned. Is there any update on the investigation into the deaths that were referred to earlier of that Coast Guard crew, the two members who died?

Admiral NIMMICH. Sir, it is an ongoing investigation. As you would expect, there are extraordinary amounts of detail that they want to get to make sure it is right, and I don't have a projection when the investigation will be done. Whenever a loss of life is done in a commercial side, the National Transportation Safety Board takes makes sure that they get the details right because we don't want to mislead anyone. This could impact future diving operations or procedures and additional people's lives. So we are making sure that we get all the details particularly right, and I don't have a prediction of when that will be available.

Mr. FILNER. It is kind of long; that is all. I mean I watch CSI all the time. They do it in an hour, so I don't know.

Did you think, by the way, that this whole polar icebreaking research is part of the core mission of the 21st Century Coast Guard? Should it be assigned to some other agency like NOAA perhaps? What is your sense of that, given your inability right now at least to fund any expansion?

Admiral NIMMICH. Sir, the competencies and the capabilities to operate in the polar region are pretty unique, and once you have those, to create those competencies and capabilities in other agencies become redundant.

I would suggest that the National Science capability can be incorporated with the sovereignty and security issues that you want in the polar region, and the Healy is a prime example. Although the Healy costs more than other icebreakers, that is because she can do more things than other icebreakers can, and she can represent the United States as a military vessel there that other vessels cannot. But the Healy has been designed in cooperation with the National Science Foundation to accommodate and to be an excellent platform for research, more so than other icebreakers of their style, sir.

Mr. FILNER. Dr. Bement, were you in agreement with his estimates and the use and the need?

Mr. BEMENT. I am sorry. Yes, I am in agreement.

Mr. FILNER. Obviously, NSF doesn't have the ability to build these right now.

Mr. BEMENT. We are science foundation; we are not an operating agency.

Mr. FILNER. Here we are in the 21st Century, and we don't have science agencies funded at any level that they should be.

Mr. BEMENT. But I think the National Research Council put it appropriately that these missions are part of a multi-mission suite

that can best be performed by either a Government icebreaker service or even a commercial icebreaker service. We find that in making inquiries, there is an increasing need for icebreaking for commercial applications, and we have, through our request for information, potential takers who would be willing to take on the icebreaking mission in the Antarctic as well as the resupply mission on an incremental cost basis. As a matter of fact, the ships that we operate in the southern ocean that have much less capabilities in icebreaking are commercially operated and commercially owned.

Mr. FILNER. Thank you, Mr. Chairman. Thank you.

Mr. LOBIONDO. Mr. Coble?

Mr. COBLE. Thank you, Mr. Chairman.

At the outset, Chairman Young expressed his intense interest in the strong polar icebreaker program, and I share that intense interest. I regret that I missed most of the testimony because of the vote on the floor.

Admiral, I think you responded to the gentleman from California, but I am going to give you a chance to extend it, if you want to. My question is: Alluding to the NRC report that stated very clearly that the United States need a strong polar icebreaker program, why is the Coast Guard the best agency to manage this program? I think you touched on it earlier, but did you want to extend on that?

Admiral NIMMICH. Yes, sir. Mr. Coble, we know you have a strong interest in icebreakers and thank you for the service that you performed back on the north one, I believe it was.

Mr. COBLE. You have a good memory, sir.

Admiral NIMMICH. Thank you, sir.

Mr. COBLE. My service was not that outstanding, but thank you for mentioning that.

Admiral NIMMICH. As I indicated, commercial entities can break ice, but they don't bring the full suite of competencies and capabilities that a U.S. law enforcement and military organization do. You are talking about the ability to enforce environmental laws, the ability to provide search and rescue capability which is not an inherent characteristic of commercial vessels. So the full suite of capabilities and competencies, law enforcement authorities that you have invested in the Coast Guard become available to you as protecting U.S. interests both in the Arctic and Antarctic, sir.

Mr. COBLE. I guess furthermore, Admiral, that would be the justification for the United States having only one polar icebreaker fleet, would it not?

Admiral NIMMICH. Sir, it eliminates the redundancy that you would have if you had two fleets, one to do law enforcement, one to do icebreaking. By having it in one fleet, you made a more effective and efficient program, sir.

Mr. COBLE. When you mentioned the cutter Northwind, my mind nostalgically refers to that. I presume she is resting in some boneyard now, is she?

Admiral NIMMICH. Sir, we will find out the answer for you.

[The informations received follows:]

USCGC NORTHWIND (WAGB 282) was decommissioned in Wilmington, North Carolina on 20 January 1989. The ″Grand Old Lady of the North″ was subse-

quently tranferred to Maritime Administration (MARAD) where she remained until being scrapped by International Shipbreakers, in the Port of Brownsville Texas in 1999. It took approximately six months to complete the scrapping.

Mr. COBLE. I would like to know that.

Finally, let me put this question to either of the four witnesses, Mr. Chairman, and this may have been addressed during my absence. What is the relationship between the National Science Foundation and the United States Coast Guard vis-a-vis the polar icebreaker program?

Mr. BEMENT. Mr. Coble, the arrangement is a memorandum of agreement between the NSF and the Coast Guard. We define the requirements for icebreaking based on the schedule for a particular year in the Antarctic. The Coast Guard then will identify their operating plan for meeting those requirements plus their estimated costs. Then we provide those costs and operate according to that plan.

Mr. COBLE. Anybody want to add to that?

Admiral NIMMICH. Yes, sir; I agree with Dr. Bement that all of the funding in order to operate icebreakers exists now in the National Science Foundation budget. That money is then, through agreement through the memorandum of understanding, transferred back to the Coast Guard to meet the needs that they have decided. The Coast Guard is the operating agency that runs the vessels, but the money to run them is in the National Science Foundation budget.

Mr. COBLE. I thank you.

Yes, Doctor?

Ms. JONES. One of our recommendations was that the relations between the Coast Guard and all of the science agencies--NSF, NOAA--should be more clearly set out, and we would ask the Administration to do that. If you want an operating entity to have a mission-capable fleet, they should be funded to do that.

Our recommendation is that the relationship with the Foundation and NOAA and other users ought to be that those science users pay incremental costs, and by that, we mean the costs beyond what the Coast Guard would be funded to operate those ships to pay for additional direct tasking beyond the normal crew, the normal patrol, the fuel that the normal patrol would use. That is a relationship that used to exist in the longer term past. Our observation was that it worked well, and we recommend that we revert to that kind of relationship.

Mr. COBLE. Thank you all for being with us.

Mr. Chairman, thank you.

Mr. LOBIONDO. All right, thank you, Mr. Coble.

Since the Polar Sea completed a modest upgrade this year, I think the estimates are that it will be mission-capable for another three to five years. Under current Federal plans, this means that the Healy will be the Coast Guard's only mission-capable polar icebreaker in as soon as three years or shortly thereafter. The National Academy study indicates that we need three icebreakers. How does the Administration plan to respond to the report's recommendations and how will the National Science Foundation keep McMurdo open when the Coast Guard is operating only the Arctic-based Healy? Anybody?

Admiral NIMMICH. Sir, the Coast Guard cutter, Polar Star, has been put in caretaker status. In caretaker status, that means with appropriated funds, it could be brought up to operational capability. The Polar Sea is the best equipped now and, with the funding received from the National Science Foundation, has been made capable of operating within the Antarctic Region to open McMurdo Bay in 2006, I am sorry, in 2007 and 2008. Additionally, I believe the National Science Foundation is contracting a second foreign-flagged icebreaker to assist, but I will leave that Mr. Bement to confirm.

In the interim until replacement or rehab could be done, external foreign-flagged vessels would have to be contracted, sir.

Mr. BEMENT. It is true that the Polar Sea is now operational. Whether it is for one or two years or four to six years is questionable. But it is always prudent to have a backup for an icebreaker operating in the Antarctic because of the extreme conditions of breaking very heavy ice.

When we put out a request for information, we discovered there were commercial entities as well as international entities that could provide the need for a backup icebreaker this year, and the one that seemed to be most appropriate was the Swedish icebreaker, Oden. So we have contracted for the Oden to serve as a backup for the Polar Sea during this season.

Mr. LOBIONDO. Admiral, has the Coast Guard completed a mission gap analysis for the icebreaking mission?

Admiral NIMMICH. Sir, we have draft mission analysis and operational requirements documents drafted. They are in draft form at this point, sir.

Mr. LOBIONDO. When will the results be available?

Admiral NIMMICH. Sir, I will get that for you for the record.

Mr. LOBIONDO. OK.

Does the Coast Guard and the National Science Foundation agree with the recommendation in the report that it should keep the Polar Star and the Polar Sea until a new icebreaker is built? I think you already established that. I am just trying to confirm it.

Mr. BEMENT. I think our position is that we need to have the flexibility to provide backup in the event that the only available icebreaker should break down. If we had to recondition the Polar Star to replace the Polar Sea, that would be a very expensive maintenance program. Given that we can contract for either commercial or international services at a much lower rate, we would want to consider all options in order to achieve that mission in the most cost-effective way.

Mr. LOBIONDO. Mr. Taylor?

Mr. TAYLOR. Thank you, Mr. Chairman.

I am curious; didn't the Soviet Union have some nuclear powered icebreakers at one point? I am curious, what was their success or lack of success with that? I happen to be doing some studying on Admiral Nimitz's efforts to get us towards a nuclear powered service fleet in the sixties, and given today's price of fuel, it sure looks like he was right then and he would certainly be right now.

Admiral NIMMICH. Sir, the Soviets do operate a fleet of nuclear powered icebreakers. When reviewed for use in the Antarctic and

Dr. Bement can either confirm or attest to this-they were not designed to be able to have cooling capability to go across the warmer waters of the Equator so that their ability to move from the Arctic to the Antarctic is severely limited and therefore they have not been available. They are higher horsepower and possibly more capable than the Star and the Sea.

Mr. TAYLOR. Does the Coast Guard or the United States Navy ever look at a cost alternative to conventionally powered? Since the life expectancy of this vessel is going to be 30 years anyway, which I am told is about the life expectancy of fuel burn rate on nuclear powered.

Admiral NIMMICH. Sir, in the past, we have not looked at nuclear capability due to the extraordinary training requirements and the technical nature of running those ships compared to the standard diesel-electric plants that we have in the current icebreakers, but that is not to say that we couldn't look at that, sir.

Mr. TAYLOR. I am sure you speak with the Soviets, now, the Russians. I am just curious; what has been their experiences as far as the cost factor? You talked about the problem with operating in warmer waters, but other than that, what kind of problems or what kind of advantages have they found?

Admiral NIMMICH. Sorry, I can't answer that, but we can give you some answer for the record.

Mr. TAYLOR. OK.

Mr. BEMENT. If I can speak for the Krasin, the Krasin was not a nuclear powered icebreaker. It was a conventionally powered icebreaker that was designed and built in Finland and operated commercially with a commercial crew so their crew size was much less than what you would normally find in a military operated icebreaker. The experience we had with the Krasin was very favorable and very positive. They met all of our requirements in the least amount of time.

Mr. TAYLOR. Admiral, going back, just as a matter of curiosity, on one of your big white ones, the Chase, for example, how many days a year would it be underway versus one of your icebreakers?

Admiral NIMMICH. Our standard for all of our larger cutters are 185 days away from home port, give or take 10 percent. The Healy operates under about that same parameter with one crew. The Healy goes about 200 to a few days over 200 days underway away from home port a year.

Mr. TAYLOR. What is your ballpark estimate for the cost of fuel on any of your larger assets as a percentage of the total operating cost of that ship? There has to be some sort of thumbnail that the Coast Guard uses.

Admiral NIMMICH. Sir, I don't want to hazard a guess on your behalf, but we can answer that. It is a percentage of the costs of operating the ship, realizing that in the ice, the fuel usage to be able to break through ice is much greater than it is to steam through open water. So the cost of fuel for a polar breaker is far greater than it would be for a 378.

That said, I guess, Dr. Bement, my question back would be: Before the total costs or for you, the incremental costs of using a Coast Guard icebreaker were similar to that that you paid for the Krasin?

Mr. BEMENT. I am getting information now.

Mr. TAYLOR. Admiral, while he is looking at that, for comparative purposes, the shaft horsepower on a 378 is what? The shaft horsepower on one of your polar classes is what? The reason I want to do that is I want to see how closely that comes to the size of each of the engines on a nuclear powered carrier.

Admiral NIMMICH. You are really testing me today, sir.

Mr. TAYLOR. Well, could you get that information?

Admiral NIMMICH. Absolutely, sir; I can tell you the shaft horsepower on the polar breakers, the Star and the Sea, is 60,000 shaft horsepower which is about 12,000 horsepower more than the Krasin could provide. That said, I don't know the exact shaft horsepower on a 378, but it depends on whether you are running on diesel or turbines. Once it moves up on turbines, it is fairly substantial but nowhere near the type of horsepower that you need to break through four to twelve feet of polar fast ice. That is an extraordinary amount of power you need to be able to drive up on top of that ice.

[The information received follows:]

The WHEC 378-foot Hamilton class ships have 36,000 shp.
USCGC HEALY (WAGB 20) has 30,000 shp.
USCG POLAR STAR (WAGB10) has 60,000 shp.
USCGC POLAR SEA (WAGB 11) has 60,000 shp.

Mr. TAYLOR. I am sure you have jumped to the conclusion that if we are serious about cutting our dependence on foreign sources of fuel, obviously, one proven alternative would be nuclear power for our vessels. That is why, even though I am sure it requires some greater cross-training with the Navy as far as where you get your engine space operators from, but we ought to have a school for that for Charleston. We already have a training line through the United States Navy. I just think it bears looking into.

I know that I am on the Armed Services Committee, working with Chairman Bartlett. We are going to do everything we can to get the Navy to look at nuclear for future surface ships, and this might provide an opportunity as well for what you are doing here. Even though the price of fuel has come down a little bit, my gut tells me the day after the election, it is off to the races again.

Admiral NIMMICH. Yes, sir, I understand your point.

[The information received follows:]

Response: Two 69,000HP nuclear powered research polar icebreakers to be constructed at Newport News Shipyard (the only U. S. shipyard capable of constructing nuclear powered ships) with triple screw electric drive would cost approximately $3.3 billion (2008 dollars). This estimate reflects U.S. Navy shipbuilding experience for the first CVN-68 class nuclear powered aircraft carrier and the requirement to develop a new or modified nuclear reactor, steam generation and turbine propulsion system.

It is estimated that a nuclear powered icebreaker would require one refueling during its service life, and the estimated cost would be $117M per reactor. It should be noted that the most advanced U. S. Navy reactors do not require mid-life refueling. It may prove possible to employ equivalent technology for nuclear powered icebreakers. Deletion of the mid-life refueling would have a limited impact on the relative costs of nuclear and conventional power plants.

If we used conventionally powered icebreakers, assuming construction at a Gulf Coast shipyard and a procurement strategy like that used for the USCGC MACKINAW (WLBB-30), the total acquisition cost for two icebreakers would be approximately $1.5 billion (2008 dollars). This cost is based on a ship with the following characteristics: 69,000HP integrated electric drive, triple screw, combined diesel and gas (electric) CODAG(E) propulsion plant, with research facilities and accommodations equivalent to USCGC HEALY. This cost includes all shipyard and government project costs. The following operational profile was assumed for these icebreakers:

Mode	Time During Deployment
Full Power (69,000HP)	4%
Light Icebreaking at Full Diesel Power (20,000 HP)	32%
High Speed Transit at Full Diesel Power (20,000HP)	32%
Beset in ice pack	32%

Based on this operational profile, each CODAG(E) cutter will consume an average of 880 gallons of fuel per hour including average propulsion, ship's services, and heating loads. With an estimated fuel cost of $2.11/gallon (2008 dollars) this equates to $8.9 million per icebreaker per year based on the specified 200 days deployed per year.

Not counting the cost of periodic nuclear refuelings, and using the annual fuel costs estimated above for a conventionally powered vessel, it will take nearly 436 years to offset the other cost differences using the estimated fuel cost of $2.11/gallon (2008 dollars).

The total ownership cost of two nuclear icebreakers was calculated to be $5 Billion dollars as compared to $3 billion dollars for conventional combined diesel and gas (electric) CODAG(E) icebreakers with identical propulsion power and scientific research facility (2008 dollars).

The difference reflects the cumulative impact of the much higher acquisition cost of the nuclear plant compared to two diesels and two gas turbines required for the CODAG(E) plant, the mid life refueling costs for the nuclear plant, the disposal costs of the nuclear plant, higher shipyard costs for nuclear quality ships, engineering costs for the new nuclear plant, and additional government costs reflecting incorporation of a nuclear propulsion system, additional more costly crewing, and increased maintenance and support.

Mr. BEMENT. Mr. Taylor, I believe I have an answer to your question. In 2004, the two polar icebreakers cost over $3 million in fuel costs, $3,039,000. In 2005, both the Polar Star and Krasin together cost $1,720,000 for fuel. Breaking that down, the Polar Star which had limited service during that campaign, the fuel cost was $1,057,000, and the cost of the fuel for the Krasin was $662,739.

Mr. TAYLOR. One last question, Mr. Chairman, but I am just curious.

One of the cases that Admiral Nimitz made back in the sixties was the savings of all the other things that go with a conventionally powered ship, that you don't have to have the oil or you don't have to coordinate the refueling at sea, you don't have the vulnerability of slowing down and having a predictable course while you are refueling.

My question would be on one of your large icebreakers. Do they carry enough fuel for the entire voyage? They leave the home port, they go to the South Pole or the North Pole, they return, or do they have to be met and replenished for fuel underway?

Admiral NIMMICH. They are not replenished underway, sir, but they do need to make a fuel stop. Either in Hawaii or in Australia, they stop to refuel before they go onto the ice.

Mr. TAYLOR. OK.

Thank you very much, Mr. Chairman.

Mr. LOBIONDO. I would like to ask unanimous consent that Mr. Filner's opening statement and my opening statement may be part of the record. Without objection, so ordered.

Mr. Diaz-Balart, are all your icebreaking needs taken care of in your district?

Mr. DIAZ-BALART. Mr. Chairman, we have a lot of icebreaking needs in Miami, and I think they have all been taken care of. I appreciate that. Thank you, sir.

[Laughter.]

Mr. LOBIONDO. I just wanted to make sure.

Mr. Filner, do you have anything further?

Mr. FILNER. No, thank you, Mr. Chairman.

Mr. LOBIONDO. I would like to thank our witnesses for being here today.

The Subcommittee is adjourned.

[Whereupon, at 2:05 p.m., the subcommittee was adjourned.]

Testimony of
Dr. Arden L. Bement, Jr., Director
National Science Foundation

Before the
House Committee on Transportation and Infrastructure
Subcommittee on Coast Guard
and
Maritime Transportation

September 26, 2006

Chairman LoBiondo, Ranking Member Filner, and distinguished members of the Committee, I am pleased to appear before the Subcommittee for the first time to speak on behalf of the National Science Foundation. NSF is an extraordinary agency, with an equally extraordinary mission of enabling discovery, supporting education, and driving innovation – all in service to society and the nation.

INTRODUCTION

The National Science Foundation was established in 1950 to initiate and support basic scientific research and programs, to strengthen scientific research potential and science education programs at all levels in the mathematical, physical, medical, biological, social, and other sciences, and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering (NSF Act of 1950; 42 USC 1861 *et seq*).

The Agency also chairs the Interagency Arctic Research Policy Committee (IARPC), created under federal statute to coordinate Arctic research sponsored by federal agencies, and it manages the U.S. Antarctic Program on behalf of the U.S. government as directed by Presidential Memorandum 6646 (1982).

The Arctic and Antarctic are premier natural laboratories whose extreme environments and geographically unique settings enable research on fundamental phenomena and processes not feasible elsewhere. In addition, climate changes now being observed in the earth's Polar Regions require careful study in view of their possible implications for northern residents and for

those living in the mid-latitudes. Changes in Polar Regions are tightly coupled to the global earth system, with changes in one strongly impacting the other.

Polar research depends heavily on ships capable of operating in ice-covered regions, either as research platforms in the Arctic and Southern Oceans or as key components of the logistics chain supporting on-continent research in Antarctica. Many areas in the Arctic and Antarctic are only accessible by ship. As the primary U.S. supporter of fundamental research in these regions, NSF is the primary customer of polar icebreaker and ice-strengthened vessel services for scientific research purposes.

NSF responsibilities in the Arctic and in Antarctica take somewhat different forms, and with the Committee's indulgence I'll explain briefly how they differ with respect to icebreaker requirements. *But in both cases the question of how best to meet those responsibilities boils down to consideration of three factors: cost, performance, and policy.*

NSF REQUIREMENTS IN THE ARCTIC

NSF supports research on the Arctic Ocean, atmosphere, and land areas, including marine and terrestrial ecosystems and their relationships to the well-being of local populations. In addition to research in individual disciplines, support is provided for interdisciplinary approaches to understanding the Arctic region, including its role in global climate. Over the last decade, changes have been measured in the distribution of polar ice cover, in atmospheric composition, Artic ocean conditions, some terrestrial parameters, as well as in northern ecosystems. Residents of the North are seeing these environmental changes affect their lives. It is important to determine whether these changes correlate to a short-term shift in regional atmospheric or ocean processes or whether they are the result of longer-term global change.

In the Arctic, science on land and in coastal areas tends to be based at a few sparsely distributed, remote outposts, and in many cases access by ship is the most advantageous means, even for projects that are not inherently oceanographic. In its few years of service, the Coast Guard icebreaker *Healy* has supported research in a variety of areas including biology, sea ice, marine geology and geophysics, cartography, physical and chemical oceanography and atmospheric science.

As research has advanced and become more technologically sophisticated, NSF has increasingly relied on coordinated international multi-ship expeditions to access the Arctic region and laboratory facilities. For example, while the USCGC *Healy* does have the capability to work alone in the deep Arctic, any vessel by itself is more risky, making multi-ship arrangements necessary in lieu of an icebreaker research platform with more robust capabilities. International collaborations also have become necessary, as the demands for research aboard the *Healy* have intensified. Recent international partnerships with Sweden involving their icebreaker, the *Oden*; and with Germany and their icebreaker, the *Polarstern*; have been highly successful, as have collaborations by NSF, NOAA and other agencies with various Canadian, Chinese, Russian and other ships.

Arctic Requirements: Ship Cost and Reliability

According to information provided by the Coast Guard, NSF typically uses approximately 90 percent of the 185-200 days current USCG deployment standards allow *Healy* to spend at sea. Science programs are limited by the ship time available on the USCGC *Healy* and also by the number of berths available for science. *Healy* can accommodate up to 50 scientific personnel in addition to its operational Coast Guard crew of about 80.

The *Healy* also faces limitations in its icebreaking capacity, especially during the spring when the ice coverage north of Alaska has been thick enough in some years (2004, 2005) to beset the ship for several days.

Under the current arrangement, NSF is responsible for funding *Healy* operations and maintenance while the Coast Guard is responsible for operating the ship and carrying out its maintenance program. Coordination between the two agencies is arranged under an MOA in which NSF provides the Coast Guard with a set of operational requirements annually and the Coast Guard responds with an operational plan and cost estimate based on those requirements. Total *Healy* costs are approximately $20 million annually, or about $100,000 per day, at sea.

I will return to the issues of cost, availability and policy shortly.

Plans have been underway for several years to construct a new ice-strengthened ship that could support scientific studies in the waters around Alaska. NSF has assigned high priority to building this ship, the Alaska Region Research Vessel (ARRV), and construction funds were included in the President's FY07 budget request. It is estimated that it will take 2.5 years to construct and deploy the ship once a shipyard contract has been issued. The ship will likely be operated by a university consortium following the model of the University-National Oceanographic Laboratory System (UNOLS) which operates a number of research vessels. The ARRV, which will replace the *Alpha Helix,* will be designed to work in up to 3 feet of ice. The ARRV will thus be able to conduct research cruises year round in the Gulf of Alaska and the southern Bering Sea; and in the summer, as far north as the Chukchi and Beaufort Seas during minimum ice cover. During heavy ice periods in the Bering Sea, the ARRV would probably need the assistance of the *Healy*. Estimated operating costs are about $20K – $30K/day.

Finally, we need better access to the deep ocean in the Arctic. Options for supporting research in the deep Arctic should be integral to any study of future icebreaker needs.

In conclusion, the *Healy* is a capable and relatively new ship that, with proper maintenance, can be the mainstay of U.S. Arctic Ocean research for years to come. However, under the current operational model, its operating cost is high and its capability limited.

NSF REQUIREMENTS IN ANTARCTICA

NSF provides approximately 85 percent of the U.S. funding for fundamental research in the Antarctic and the southern ocean. This research addresses a wide array of topics across many disciplines. For instance, researchers are studying topics as wide-ranging as the evolution of the

ozone hole; the impact of extreme environments on gene expression; the effects of ultraviolet radiation on living organisms; the relationship between changes in the ice sheet and global sea level; global weather, climate, and ocean circulation; the role of Antarctica in global tectonics and the evolution of life through geologic time; and the early evolution of our universe, as well as its current composition.

This research requires access to ships serving *two quite different functions:* multi-purpose icebreakers that can operate in the Southern Ocean as research platforms that also resupply our coastal Palmer Station on the Antarctic Peninsula; and heavy-duty icebreakers that can open a resupply channel through fast ice to McMurdo Station. From McMurdo, supplies are transferred to the U.S. research station at the South Pole and to temporary remote field stations at various points on the continent. These two requirements are met in quite different ways.

Antarctic Ship-Based Research Platforms: Ship Cost, Availability and Policy

U.S. Antarctic Program ship-based research and Palmer Station resupply depend primarily on two privately-owned vessels, the *Laurence M. Gould* (LMG) and the *Nathaniel B. Palmer* (NBP).

The NBP is leased by NSF's prime contractor, currently Raytheon Polar Services Company (RPSC), from the Louisiana-based shipping company, Edison Chouest Offshore (ECO). The vessel was built to specifications developed on the basis of input from the science community. The ship is an ABS A2 icebreaker capable of breaking 3 feet of level ice continuously at 3 knots, with 13,000 shaft horsepower and a displacement of 6,800 long tons. She is outfitted with all of the winches and A-frames necessary for deploying and retrieving oceanographic instrumentation. She is fully outfitted with on-board oceanographic instrumentation and a networked computer suite, including multi-beam sonar, and has 5,900 ft^2 of lab space and 4,076 ft^2 of open deck space for oceanographic work and staging.

The NBP averages 300 days a year underway in support of science.

As is the case for the NBP, the *Laurence M. Gould* is leased by Raytheon from Edison Chouest Offshore (ECO). Also like the NBP, the vessel was designed and built on the basis of input from the science community. The ship is smaller than the NBP and has less ice breaking capability, as it was designed to operate in the more benign ice regions surrounding the Antarctic Peninsula. The ship is an ABS A1 ice-strengthened vessel with 4,600 shaft horsepower and a displacement of 3,400 long tons and can break one foot of level ice at a continuous 3 knots. She is fully instrumented with on-board oceanographic instruments and a networked computer suite. The LMG has the dual purpose of supporting oceanographic science and providing re-supply to Palmer Station, located on the Antarctic Peninsula.

The LMG averages 320 days a year underway in support of scientific research and associated logistics.

Annual costs for the NPB and LMG are $16.3M and $7.5M, respectively, resulting in respective day costs of $54.3K and $23.4K for these ships.

Antarctic Station Resupply: Ship Cost, Reliability and Policy

As noted above, the resupply of the McMurdo and South Pole Stations, as well as of temporary remote field stations in Antarctica, depends on gaining access to the McMurdo pier through the ice in McMurdo Sound. In most previous years, the channel was opened by one U.S. Coast Guard Polar Class vessel (either the *Polar Star* or the *Polar Sea*), but more recently two icebreaking vessels have been needed due to extreme ice conditions and concerns about the reliability of the aging Polar Class vessels.

After opening the channel, the icebreaker escorts two vessels, a tanker and a freighter, to and from the ice pier at McMurdo. These re-supply vessels are ice-strengthened commercial vessels chartered by the Military Sealift Command (MSC). (The Navy used to operate all of their own tankers and freighters, but more recently has depended on commercial contractors for construction, maintenance and staffing of vessels. As a result, MSC now charters virtually all of the tankers and freighters used by the DoD either through a direct industry charter or through a government-owned, contractor-operated (GOCO) arrangement.)

Two years ago, acting on advice from the Coast Guard that a second icebreaker should be brought in to assist the *Polar Star*, NSF chartered the Russian icebreaker *Krasin* for the purpose. The Coast Guard's *Polar Sea* was undergoing repairs and no other U.S. icebreakers other than *Healy* were available – but *Healy* was needed in the Arctic. Last year the *Polar Sea* was undergoing extensive repair. NSF again chartered the Russian icebreaker *Krasin* and held *Polar Star* in reserve (and eventually brought her in to assist in the final stages of the break-in). The situation for the coming year is again similar. *Polar Sea* is ready for duty but the Coast Guard has recommended that a backup vessel be employed. NSF has therefore nearly concluded a charter for the Swedish icebreaker, *Oden*.

The USCG has performed its icebreaking mission in Antarctica with distinction for many decades, but with increasing difficulty in recent years. Its two Polar Class icebreakers are nearing the end of their estimated lifetime and are becoming increasingly difficult and costly to keep in service. The need to charter the *Krasin* and *Oden* has already been mentioned. Given this state of affairs, NSF has given careful consideration to how best to meet the needs of the scientific community over the long-term.

Under the current arrangement between NSF and the Coast Guard, NSF provides all the funding for USCG icebreaker operations and maintenance, and the Coast Guard carries out those duties. NSF provided $55.74M for operation of the USCG polar class icebreakers in 2006. In addition, NSF provided approximately $8 million for fuel and charter of *Krasin*. When chartering commercial vessels such as the *Krasin* and the *Oden*, NSF pays only for the time that the ships are under charter.

USE OF COMMERCIAL SHIPS AND MODELS/MODES OF OPERATION

As noted above, NSF has met the research community's need for research platforms in the Southern Ocean through long-term contracts with private firms for ice-strengthened ships and icebreakers and through partnerships that provide access to other country's research vessels. For resupply of McMurdo and South Pole Stations, NSF has depended until recently entirely on U.S. Coast Guard icebreakers secured through reimbursement arrangements, and on chartered Military Sealift Command capabilities. More recently, NSF has had to arrange for charted vessels to complement USCG capabilities. In the Arctic, NSF has relied on the Coast Guard's *Healy* and on partnerships with other countries. Once constructed and commissioned, the Arctic Regional Research Vessel *(ARRV)* will significantly increase the capacity for ship-based research in the coastal Arctic regions and where ice cover is not too deep.

A variety of models have and are being used by the U.S and other countries for meeting polar icebreaker needs. The U.S. Coast Guard and the Chilean and Argentinean Navies operate their icebreakers using military personnel. Some countries build their ships to meet military specifications and others do not. The German research icebreaker, the *Polarstern,* is owned by the government but operated by a private contractor. The Swedish government's operational arrangements for the *Oden* are similar to the German model. Both the *Oden* and the *Polarstern* are able to operate more than 300 days annually as a consequence of ship design and mode of operation. The Arctic Regional Research Vessel *(ARRV)* will be operated by civilian crews under contract to the University-National Oceanographic Laboratory Systems (UNOLS).

As noted above, NSF employs a contractor to operate and maintain the privately-owned *Laurence M. Gould* and *Nathanial B. Palmer.* The ships were built under a long-term lease agreement between the ship-owners and the Federal government, such that the construction costs are partially amortized over the duration of the lease (with the ship reverting to the owner at the government's option at the end of the lease). These ships also operate more than 300 days annually.

Finally, and as noted previously, the U.S. Military Sealift Command meets its needs (and those of NSF's for transport to McMurdo Station) either through commercial charters for ships and crews, or through government-owned, contractor-operated arrangements.

MEETING FUTURE NEEDS

International cooperation to provide icebreaker research platforms will surely increase, both in arranging multi-ship expeditions and in sharing platforms. Certainly as Germany and the European community move forward in constructing the planned *Aurora Borealis*, NSF will work to establish mutually beneficial partnerships.

NSF's commitment to polar research and its responsibility for management of the U.S. Antarctic Program remains constant and therefore perpetuates the need for an icebreaker to open the shipping channel through the Ross Sea to enable resupply of the McMurdo and South Pole

stations. Because opening the channel to McMurdo requires only a fraction of the time a modern icebreaker can operate annually, there may be interest among shipbuilders in providing icebreaker services to the government under a contract in which the builder can lease the ship to others (other countries or private firms) during the remainder of the year.

Clearly, the economics and efficiencies of the various acquisition and operating models merit further study. For research in the Arctic, the *Healy* should be a mainstay for many years to come, though its utility is restricted by its 200-day operational limitation. The *Healy's* inability to access the deep Arctic during periods of heavy ice cover is another limitation. These limitations, combined with a military deployment mode, make the *Healy* as currently operated, a very expensive way to meet the needs of the research community. NSF has proposed in staff level discussions with the Coast Guard that we engage in a joint study to explore ways to operate the ship in a more cost-effective manner. Of course the result will depend on the range of missions the ship will be expected to meet.

And as noted above, once in service the *ARRV* will be a valuable additional resource for Arctic research. Of equal importance is the need for an icebreaker research platform that is capable of supporting deep Arctic research.

For Antarctic research the issues are different. The two existing Coast Guard Polar Class ships are at or close to the end of their service life. They have become unreliable and very expensive to operate and maintain. The overriding question is how to open the channel through the ice to McMurdo Station so that year-round operation of the nation's McMurdo and South Pole stations can continue. This year-round occupation is central to demonstrating the "active and influential presence" which is the cornerstone of U.S. policy in Antarctica as articulated in Presidential Memorandum No. 6646 on U.S. Antarctic Policy and Programs (February 5, 1982). Other factors contributing to this presence are the 600 days annually that NSF's research vessels, the *LM Gould* and the *NB Palmer*, operate in Antarctic waters; the annual visit of the Coast Guard cutter to the Ross Sea; the approximately twenty C-17 Air Force flights annually that fly passengers and cargo between New Zealand and McMurdo; and the more than 400 Air National Guard LC-130 flights annually that provide transportation for people and equipment throughout the continent.

In considering how best to insure the continued annual resupply of McMurdo Station and to meet our responsibility for the entire U.S. Antarctic Program, NSF operates in accordance with U.S. Policy and the instructions contained in Presidential Memorandum No. 6646, that "Every effort shall be made to manage the program in a manner that maximizes cost effectiveness and return on investment."

Accordingly, and after consultations with officials in OSTP and OMB, I wrote on May 31, 2006, to the chair of the NAS/NRC icebreaker study, Dr. Anita Jones, as follows: "Given the rapidly escalating costs of government providers for icebreaking services and the uncertain availability of USCG icebreakers beyond the next two years, it is NSF's intention to ... [seek] competitive bids for icebreaking services that support the broad goals of the USAP. This competition will be open to commercial, government, and international service providers." The request for proposals will not be for ships but rather for services and we would expect the service

providers to use their ships for other purposes when not in service to meet NSF needs. Thus the cost to the Agency should be substantially reduced.

Mr. Chairman, I appreciate the opportunity to appear before the Subcommittee to speak on behalf of the National Science Foundation. I would be pleased to answer any questions that you may have.

THE HONORABLE BOB FILNER
RANKING DEMOCRAT
SUBCOMMITTEE ON COAST GUARD AND
MARITIME TRANSPORTATION
ON
OVERSIGHT HEARING ON
POLAR ICEBREAKING
September 26, 2006

Thank you Mr. Chairman for scheduling today's hearing on our nation's polar icebreaking operations in the Arctic and the Antarctic.

Until 1967, these polar icebreaking operations were conducted by the U.S. Navy. With the creation of the Department of Transportation, those mission responsibilities, and the Navy's icebreakers, were transferred to the Coast Guard.

Upon accepting polar icebreaking operations, the Coast guard began a program to replace the aging fleet of icebreakers they received from the Navy with new Polar Class icebreakers, the POLAR STAR and the POLAR SEA. In 1999, the Coast Guard added the icebreaker HEALY to their fleet.

For the United States to continue polar icebreaking operations, either the POLAR STAR and POLAR SEA will need to have major capital improvements or they will need to be replaced with new modern polar class icebreakers.

That raises a number of questions for Congress to consider:

1. Is it a national priority for the United States to continue polar icebreaking in support of scientific research?
2. If Polar icebreaking is a national priority, what Federal agency should perform this mission? Should these program responsibilities remain with the Coast Guard or be transferred to another uniformed service that carries out other oceanographic research such as the National Oceanic and Atmospheric Administration?
3. What is the cost of building new polar class icebreakers in a U.S. shipyard?
4. If polar icebreaking responsibilities are to remain in the Coast Guard, will there be sufficient funding to build new polar icebreakers when we are going to spend almost $1 billion each year for the next 20 years on the DEEPWATER PROGRAM?
5. Should other Federal agencies, such as the National Science Foundation, that use the polar icebreakers as research platforms pay for some of the capital costs of building new icebreakers?

I suspect that we are going to find that neither the Coast Guard nor the National Science Foundation is going to be able to afford to spend $1 billion to build 2 new polar class icebreakers. We may have to look at other options. For example, could the Federal Government lease polar icebreakers from the private sector as the National Science Foundation has done in the past?

Again, thank you Mr. Chairman for scheduling today's hearing. I look forward to learning more about polar icebreaking and what the appropriate Federal role should be in these operations in the future.

POLAR ICEBREAKERS IN A CHANGING WORLD: AN ASSESSMENT OF U.S. NEEDS

Statement of

The Honorable Anita K. Jones
University Professor at The University Of Virginia
and
Chair, Committee on the Assessment of U.S. Coast Guard Polar Icebreaker Roles and Future Needs
Polar Research Board
Transportation Research Board
The National Academies

Before the
Subcommittee on Coast Guard and Maritime Transportation
Committee on Transportation and Infrastructure
U.S. House of Representatives

September 26, 2006

Good afternoon Mr. Chairman, Members of the Subcommittee, and staff: Thank you for inviting me to speak to you today about the current and future roles of the U.S. Coast Guard in U.S. polar icebreaking operations and to explain the importance of this function to national needs.

My name is Anita K. Jones and I am here in my capacity as Chair of the National Academies Committee to Assess U.S. Coast Guard Polar Icebreaker Roles and Future Needs. Our Committee was asked to provide a comprehensive assessment of polar icebreaker missions, how these missions might change over time, and how we can reliably meet all national needs given the state of our icebreaker fleet. I will be presenting the results of our just-completed study, "Polar Icebreakers in a Changing World: An Assessment of U.S. Needs."

The United States has enduring national and strategic interests in the Arctic and Antarctic and the importance these regions is growing with time. In the north, the United States has territory and citizens above the Arctic Circle, creating significant national interests. In the south, the United States maintains three year-round scientific stations to assert U.S. presence and assure U.S. leadership among the nations that are signatories to the Antarctic Treaty. The United States uses that leadership to ensure that the Antarctic Treaty area, comprised of all land and waters below 60 degrees south latitude, are preserved for peaceful purposes and scientific research.

Antarctica is an ice-covered continent surrounded by an ocean, parts of which are seasonally ice-covered. The central Arctic Ocean is perpetually ice-covered and in the winter ice extends along the northwestern Alaskan coast and south through the Bering Strait. Asserting national interests and achieving national purposes in both polar regions requires polar icebreakers, ships capable of operating in a variety of challenging ice conditions. Over the past several decades, the U.S. government supported its polar interests with a fleet of four icebreakers. Three of these, including the world's most powerful non-nuclear icebreakers, POLAR SEA and POLAR STAR, and the modern research icebreaker HEALY, have been operated by the U.S. Coast Guard. These three ships are designed to support U.S. Coast Guard missions and to support science: we refer to these as "multi-mission" ships as opposed to single mission vessels. The National Science Foundation (NSF) leases a fourth ship that has limited icebreaking capabilities and is dedicated entirely to Antarctic research—a single mission. Today, the POLAR STAR and the POLAR SEA are at the end of their designed service lives of 30 years.

As directed by Congress, the U.S. Coast Guard requested the National Research Council of the National Academies to convene the Committee on the Assessment of U.S. Coast Guard Polar Icebreaker Roles and Future Needs. The Committee was asked to provide a comprehensive assessment of the current and future roles of U.S. Coast Guard polar icebreakers. The Committee was asked to analyze any changes in roles and missions of polar icebreakers in the support of all national priorities, including consideration of ongoing and predicted environmental change and to assess whether changes to the existing laws governing the U.S. Coast Guard polar icebreaking operations are needed to address potential new missions and new operating regimes.

ICEBREAKING NEEDS IN THE ARCTIC

During winter, the entire Alaskan northern coast and a substantial portion of the

Alaskan western coast is ice-bound. In summer the Arctic sea ice margin retreats northward, although not uniformly or predictably, usually creating open waters along the entire coastline for several weeks to several months. Summer sea ice extent is expected to continue to retreat over the next several decades, creating more broken ice along the Alaskan coastline.

Economic activity is predicted to increase and move northward as a result of sea ice retreat. Those deploying fishing fleets, cruise ships, mining and the associated ore transit ships, as well as petroleum recovery and tanker ship transport anticipate increased operations in the region. When current orders for ice-strengthened tankers have been filled, the world wide fleet of these vessels will double in number. Ice retreat increases the cost-effectiveness of using the Northern Sea Route (primarily north of Russia) and the Northwest Passage (primarily north of Canada) for transporting petroleum, ore, and cargo. Both routes include U.S. Arctic waters.

The potential for increased human activity in northern latitudes will likely increase the need for the United States to assert a more active and influential presence in the Arctic to protect not only its territorial interests, but also to project its presence as a world power concerned with the security, economic, scientific and international political issues of the region.

Possible ratification of the U.N. Convention on the Law of the Sea implies that the United States would require extensive mapping of the U.S. continental shelf off Alaska, should the United States wish to use Article 76 in the Convention to extend its continental shelf beyond the 200 nm economic zone and/or to counter territorial claims by other Arctic nations.

More variable and less predictable weather and sea ice conditions now occur in the Arctic. Both have made it more difficult for indigenous populations to predict when to initiate and terminate the culturally-important, annual whale hunt, as well as when it is safe to travel over coastal ice or hunt further from shore.

Over the past decades the U.S. Coast Guard has not conducted routine patrols in ice-covered waters due to a lack of funding. The growing human presence and increased economic activity in the Arctic will be best served by reinstating patrols in U.S. coastal waters and increasing U.S. presence in international waters of the north. To assert U.S. interests in the Arctic, the nation needs to be able to access various sites throughout the region at various times of the year, reliably and at will. While the southern extent of the Arctic ice pack is thinning and becoming less extensive during the summer, there is no question that polar icebreakers will be required for many decades for egress to much of the Arctic basin. Ice conditions in the U.S. Arctic are among the most variable and occasionally challenging through the circum-Arctic. National interests require icebreakers that can navigate the most formidable ice conditions encountered in the Arctic.

Recommendation #1: The United States should continue to project an active and influential presence in the Arctic to support its interests. This requires U.S. government polar icebreaking capability to assure year-round access throughout the region.

ICEBREAKING NEEDS IN THE ANTARCTIC

Multiple national policy statements and Presidential Decision Directives have reaffirmed the importance of an "active and influential" U.S. presence in Antarctica in support of U.S. leadership in the Antarctic Treaty governance process and as a geopolitical statement of U.S. world wide interests. The United States is committed to preserving Antarctica exclusively for peaceful purposes, furthering scientific knowledge, and preserving and protecting one of the most pristine environments on the globe.

The U.S. presence in Antarctica is principally established by the year-round occupation of three stations: McMurdo, Palmer, and South Pole. This presence secures the United States' influential role in the Treaty's decision-making system and maintains the political and legal balance necessary to protect the U.S. position on Antarctic sovereignty. Many view the permanent year-round presence of the United States as a major deterrent to those countries that might otherwise wish to exercise their overlapping territorial claims. Thus, scientific activity in the Antarctic is an instrument of foreign policy.

The U.S. research presence in Antarctica currently relies on ship-borne resupply with the majority of fuel and cargo for the U.S. Antarctic Program delivered to McMurdo Station by tanker and container ship. Fuel and supplies are ferried from McMurdo to the South Pole Station and remote field sites by aircraft or overland traverse. Multiple studies over the years have repeatedly confirmed that the safest and most cost-effective means of transporting the necessary quantities of fuel and cargo to McMurdo Station is by ship.

Presently two ice-strengthened ships chartered by the Military Sealift Command transport cargo and fuel and remove refuse. These ships *require* icebreakers to open a shipping channel through the shore-fast ice to McMurdo Station, which has been up to 80 miles long, and to provide close escort to and from the ice pier. During the past six years, the break-in through McMurdo Sound has become increasingly more challenging. Until 2006, large icebergs in the Ross Sea have blocked wind and currents from clearing the ice from McMurdo Sound, and the blockage has increased the amount of harder, thicker, multi-year ice in the Sound. The last six seasons have generally required two icebreakers to break and groom the channel and escort the transport ships through the channel.

For the past couple of years, because the condition of the POLAR STAR and POLAR SEA has required increased maintenance as they near the end of their service lives, the National Science Foundation contracted the services of the Russian icebreaker KRASIN. Approximately the same age as POLAR STAR, KRASIN assisted the POLAR STAR in 2005 and in early 2006 conducted the break-in alone but broke a propeller blade (which a U.S. Navy diving and salvage team could not repair) before escorting the tanker and container ship through difficult ice conditions. The POLAR STAR was dispatched from Seattle, where it was in stand-by status. The KRASIN was able to escort the tanker to the pier, and when re-fueling of the McMurdo tank farm commenced, only five days of fuel remained. These events highlight the difficult ice conditions, the aging condition of the two U.S. icebreakers powerful enough to perform the McMurdo break-in, and the condition of icebreakers that can be chartered on the open market. These circumstances make future resupply missions vulnerable to failure.

While there is ongoing discussion of the possibility of being able to store enough fuel and supplies to skip a resupply in a given year, the fact remains that the United States

will need the ability to break a channel and resupply McMurdo Station by ship in any given year. This reality requires reliably-controlled icebreaker capability that can be assured over decades. Annual charter—commercial or from another nation—provides insufficient assurance of successful resupply for the long term.

The Committee concludes that for the purposes of the single mission of McMurdo resupply, the icebreakers do not necessarily need to be operated by the U.S. Coast Guard, but to best meet mission assurance requirements they should be U.S. flagged, U.S. owned, and U.S. operated. Without specific proposals it is difficult to evaluate the cost-effectiveness or the possibility that other nations might partner to invest in a Polar class icebreaker with the United States.

Ice conditions will be increasingly difficult until a considerable portion of the multi-year ice in the Sound is removed by natural processes. For the foreseeable future, two polar icebreakers will be needed to support the resupply mission at an acceptable level of risk. U.S. icebreaking assets must be sized to handle the most difficult ice conditions in McMurdo Sound.

Recommendation #2: The United States should continue to project an active and influential presence in the Antarctic to support its interests. The nation should reliably control sufficient icebreaking capability to break a channel into and assure the maritime resupply of McMurdo Station.

SUPPORT OF U.S. POLAR RESEARCH

The history of polar research is directly tied to the geopolitical circumstances following World War II and the subsequent Cold War era. In the South this was evidenced by the deployment of nearly 3,000 personnel to Antarctica in the United State's commitment to the International Geophysical Year (IGY) in 1957-1958. While polar research was seen as important, it also provided a mechanism to project U.S. global presence and power in a manner that served U.S. interests. Construction of the Distant Early Warning (DEW) Line radars looking toward the former Soviet Union necessitated a year-round presence, creating a need for a better understanding of the Arctic environment and improvement in our ability to work and live in the extreme cold. The establishment of research facilities in Barrow was an outgrowth of the political and military necessities of the time.

Fundamental advances resulting from polar research have directly benefited society. Polar research led to the identification of the presence and cause of the "ozone hole," and has resulted in coordinated world wide actions to discontinue the use of chloroflurocarbons. Understanding how the polar regions affect ocean circulation is leading to a better understanding of global climate. The study of Weddell seals, which dive to great depths and cease breathing for long periods, led to better understanding of how such mammals handle gas dissolved in blood during and after deep diving events. This contributed to advances in understanding Sudden Infant Death Syndrome (SIDS). The study of mammals, insects, and plants that endure freezing temperatures, yet prevent the formation of ice crystals in their internal fluids, is aiding in the design of freeze-resistant crops and improved biomedical cryo-preservation techniques.

The Arctic and Antarctic are natural laboratories whose extreme, relatively pristine environments and geographically unique settings enable research on fundamental

phenomena and processes that are feasible no where else. Today, researchers seek a better understanding of how new ocean crusts form, how organisms adapt to the extremes of temperature and seasonality (light conditions), how ice sheets behave, and how the solar wind and the earth interact. Unexplored, subglacial lakes in the Antarctic that have been sealed from the atmosphere for millions of years are soon to be explored and entered. Beneath the South Pole Station a cubic kilometer of clear ice is being instrumented with 5,000 detectors to observe high-energy neutrinos that may tell us about phenomena such as supernovae. Pristine ice cores that span centuries give direct data about temperature changes and atmospheric gas concentrations in the past.

As global climate has garnered world wide attention, the polar regions have been found to react acutely to fluctuations in climate and temperatures. The 40 percent reduction in Arctic sea ice thickness over the past four decades is one of the most dramatic examples of recent changes. As ice tends to reflect solar radiation and water absorbs it, melting in the polar regions can exert a strong influence on both atmospheric climate and ocean circulation. Huge reservoirs of water are held in massive ice sheets and glaciers; substantive release may create major climate and social dislocations. Thus, research in these regions plays a pivotal role in the global earth system exerting influences of critical importance. Scientists have declared 2007-2008 to be the International Polar Year. Multi-national collaboration and new polar research activities are planned.

The health and continued vitality of polar research is intimately linked to the availability of the appropriate infrastructure and logistical support to allow scientists to work in these harsh environments. Access to the polar regions is essential if the United States is to continue to be a leader in polar science. To operate reliably and safely in these regions necessitates a national ice-breaking capability. Icebreakers enable resupply to land-based stations and field camps in the south. Availability of polar icebreakers with greater icebreaking capability would enable important new research in the southern ocean in locations where ice is thick. While other assets and platforms such as airplanes and space-borne sensors are useful tools, surface ground-truth and *in situ* sampling will not be replaced in the near future. Because there are no land sites in the central Arctic, an icebreaker is an essential platform to support sustained scientific measurements in the Arctic Ocean. The availability of adequate ice-breaking capabilities will be essential to advancing research in both polar regions.

Recommendation #3: The United States should maintain leadership in polar research. This requires icebreaking capability to provide access to the deep Arctic and the ice-covered waters of the Antarctic.

RENEWAL OF THE NATION'S POLAR ICEBREAKING FLEET

Projecting an active and influential presence in the polar regions requires that the United States be able to access polar sites at various times of the year to accomplish multiple missions, reliably and at will. Air borne, space borne and submarine assets can only partially address these missions. The presence of surface ships in ice-covered waters is necessitated by geopolitics. In recent correspondence to this Committee, the Department of State, Department of Defense, and Department of Homeland Security further validated that icebreaking capability is necessary to protect national interests in

the polar regions. Thus, the United States requires ships that can assure access through thick multi-year ice in the northern and southern polar regions. Based on these broad missions, the Committee believes that the core of the icebreaking fleet must be the multi-mission ships operated by the U.S. Coast Guard, a military organization.

The current sea-going U.S. fleet of four ships includes three multi-mission ships operated by the U.S. Coast Guard and one ship, the PALMER, dedicated to scientific research and appropriately operated by the NSF. One of the three multi-mission ships, the HEALY, was commissioned in 1999 and its performance has exceeded design specifications. The HEALY's operating time is dedicated to the support of Arctic research. While capable of performing many additional U.S. Coast Guard missions including search and rescue, sovereignty, presence and law enforcement, the HEALY cannot independently operate in the ice conditions of the Central Arctic and McMurdo Sound. The HEALY was built to complement the Polar class ships.

The two polar icebreakers in today's U.S. icebreaker fleet are at the end of their 30-year designed service lives. Over the last decade, some routine maintenance has been deferred due to a lack of funds, and no major life extension program has been planned to extend their service. As a consequence U.S. icebreaking capability is today at risk of being unable to support national interests in the north and the south.

This Committee believes that the nation continues to require a fleet that includes a minimum of three multi-mission ships. This conclusion is consistent with the findings of an earlier study, the 1984 United States Polar Icebreaker Requirements Study conducted by U.S. Coast Guard, Office of Management and Budget, NSF, National Oceanic and Atmospheric Administration, Department of Defense, Maritime Administration, and Department of Transportation. It is also consistent with a 1990 Presidential Report to Congress that reiterated that polar icebreakers were instruments of national policy and presence and that three [multi-mission] polar icebreakers were necessary to meet the defense, security, sovereignty, economic, and scientific needs of the nation (together with a fourth, dedicated research ship, the PALMER). The Committee agrees with the findings of the two previous reports. In addition, the Committee notes that icebreaking needs have increased since 1990 and will continue to increase into the foreseeable future. This projected increased demand is a direct effect of a changing climate facilitating increased human presence in the Arctic.

Although the demand for icebreaking capability is predicted to increase, the Committee believes that the application of the latest technology, creative crewing models, wise management of ice conditions, and more efficient use of the icebreaker fleet and other assets can be used to meet increased requirements while maintaining the number and configuration of the icebreaker fleet the same as today—two Polar class ships, HEALY and PALMER. The demand for icebreaking capability in support of research is also increasing. Increasing science requirements will likely be met by a more capable replacement for the Palmer to conduct Antarctic research, and by a planned ice-strengthened Alaskan Region Research Vessel for light ice conditions in the Arctic. The Committee concluded that the demand of the science community for dedicated research vessels with a variety of ice breaking capabilities will greatly increase in both polar regions. When used in conjunction with the polar icebreakers, research ships will be able to venture into waters that they alone could not safely transit, maximizing the return on the nation's investment in science and the ice breaking fleet.

One new polar icebreaker is insufficient for several logical reasons. First, a single ship cannot be in more than one location at one time. No matter how technologically advanced or efficiently operated, a single polar icebreaker can be operational (on station) in the polar regions for only a portion of any year. An icebreaker requires regular maintenance and technical support from shipyards and industrial facilities, must re-provision regularly, and needs to effect periodic crew change-outs. These functions cannot be conducted practically or economically "in the ice" and therefore require transit time to and from polar operating areas. A single icebreaker, therefore, could not meet any reasonable standard of active and influential presence, and reliable, at-will access throughout the polar regions.

A second consideration supporting the need for more than a single polar icebreaker is the potential risk of failure in the harsh conditions of polar operations. Icebreakers are the only ships designed to collide regularly with hard objects, and to go independently where no other surface vessels can survive. Despite their intrinsic robustness, damage and system failure are always a risk, and the U.S. fleet must have enough depth to provide back-up assistance. Being forced to operate with only a single icebreaker would necessarily require the ship to accept a more conservative operating profile, avoiding more challenging ice conditions because reliable assistance would not be available. A second capable icebreaker, either operating elsewhere or in homeport, would provide assured back-up assistance and would allow for more robust operations by the other ship.

From a more strategic, longer-term perspective, two new icebreakers will far better position the nation for the increasing challenges emerging in both polar regions. Building two new icebreakers will assure maintenance of this level of capability. A second new ship would allow the U. S. Coast Guard to re-establish an active patrol presence in U.S. waters north of Alaska to meet statutory responsibilities that will inevitably derive from increased human activity, economic development, and environmental changes. Other unplanned situations can include search and rescue cases, pollution incidents where initial response and U.S. Coast Guard monitoring is necessary, and assistance to ships threatened with grounding or damage by ice. The likelihood of these situations will increase as the number of ice-strengthened tankers, tourist ships, and other vessels in the polar regions grows.

Moreover, a second new ship will leverage the possibilities for simultaneous operations in widely disparate geographic areas (such as concurrent operations in the Arctic and Antarctic), open additional solutions for conducting Antarctic logistics, allow safer multiple-ship operations in the most demanding ice conditions and areas, and increase opportunities for international expeditions. Finally, an up-front decision to build two new polar icebreakers will allow economies in the design and construction process, and provide a predictable cost reduction for the second ship.

The Committee was asked to consider alternative ship ownership options. Considering the McMurdo break-in mission alone, the Committee found that to best meet mission assurance requirements, only a U.S. flagged, U.S. owned, and U.S. operated ship provides sufficiently reliable control. While that ship might be leased commercially through a long-term lease/build arrangement, from a total fleet perspective it may be more cost-effective if science mission users only pay incremental costs—as has been the case in the past—and if the U.S. Coast Guard provides McMurdo resupply support from

the multi-mission icebreaker fleet. Also, the sovereign presence of the United States is not well served by a "leased ship." Lease arrangements do not assure that the United States could assert its foreign policy will at times and places of its choosing.

The Committee concludes that the research support mission and other U.S. Coast Guard missions can be, in many cases, compatibly performed with a single ship. The two existing polar class ships and the HEALY are equipped to support research and have productively served that mission. The Committee believes that it is advantageous to configure the U.S. Coast Guard ships with appropriate science facilities as well as for the U.S. Coast Guard's more general missions. In the long run, constituting the nation's icebreaking fleet as a single fleet of complementary ships will yield more capability and should be more cost-effective than if each agency independently acquires icebreaking ships. This approach is in line with the long held belief that the nation can gain the greatest economy from the sharing of assets across agencies and programs when appropriate and feasible and those users should share in the incremental increase in cost associated with directed usage of national assets.

The Committee was asked in what manner to acquire ships. The benefits of constructing a new ship were compared to overhauling and extending the life of POLAR STAR or POLAR SEA. A so-called service life extension program (SLEP) involves wholesale replacement of the propulsion plant and auxiliary, control and habitation support systems. While the cost of a new hull could be avoided, the retrofit of most systems would be costly and limited by the constraints of the existing hull. The Committee recommends new construction for several reasons. There is effective, new technology, particularly new hull designs that could not be retrofitted to an existing ship. The hull and ship interior structure limit retrofit design choices, thus diminishing capability. We estimate that a SLEP would likely cost at a minimum more than half of a new construction cost. Some SLEP programs have overrun their budgets and have cost as much as construction of a new ship. A newly designed ship would also meet more stringent environmental standards than the current ships.

Recommendation #4: National interests in the polar regions require that the United States immediately program, budget, design, and construct two new polar icebreakers to be operated by the U.S. Coast Guard.

TRANSITION TO A NEW POLAR ICEBREAKING FLEET

It is expected that the new polar icebreakers will not enter service for another 8 to 10 years until the program, budget, design, construction, and test phases are completed. During this time the United States needs a transition strategy to assure a minimum level of icebreaker capability. The Committee recommends a continuing maintenance and repair program for the POLAR SEA, building on the work recently completed, to keep it mission capable until at least the first new polar ship enters service. The cost to keep this ship mission capable will be much less than a service life extension program. The resulting capability, an upgraded POLAR SEA and a fully capable HEALY, is less than this Committee believes the nation needs, but a cost-effective strategy should emphasize new construction rather than maintenance of aging ships. The nation may have to charter supplemental ship services during the transition to new ships. The Committee also advises that the POLAR STAR continue to be kept in caretaker status, indefinitely

moored at the U.S. Coast Guard pier. If the POLAR SEA has catastrophic problems, the POLAR STAR could be reactivated and brought back into service within a year or so.

This transition strategy carries risk, and that risk comes from a decade of inaction. The strategy would permit the United States to locate an icebreaker (POLAR SEA and HEALY) in each polar region as needed. The two ships could leverage each other, for example on a central Arctic mission, or in McMurdo Sound. The NSF may need to supplement the POLAR SEA with a commercial or internationally chartered ship when the McMurdo break-in is particularly difficult as is expected in the coming year. This strategy is not ideal, and it carries significant risk, but due to the long lead-time for new ships there are no alternatives.

Execution of this transition strategy has already commenced. The POLAR SEA completed sea and ice trials in August, 2006 after undergoing repair work at a cost of approximately $30 million.

Keeping the POLAR SEA mission capable to roughly 2015 will require further investment in maintenance and system renewal. The U.S. Coast Guard should determine the best way to do this work One strategy is for the POLAR SEA to be taken out of service for a year of shipyard work around 2012, at a cost of roughly $40 million. An alternative maintenance strategy that avoids having the POLAR SEA out of service for a year is to perform the work in increments year-by-year when the ship is in port. Careful planning would be required for the U.S. Coast Guard to determine which upgrade strategy is better. (This report discusses these issues in more detail in chapter 10.) By 2012 the NSF may be prepared to skip the McMurdo resupply for one year, or the NSF might arrange for an alternative icebreaker to perform the break in during a year that the POLAR SEA is in the shipyard.

Recommendation #5: To provide continuity of U.S. icebreaking capabilities, the POLAR SEA should remain mission capable and the POLAR STAR should remain available for reactivation until the new polar icebreakers enter service.

MANAGING THE NATION'S POLAR ICEBREAKING FLEET

Both icebreaker operations and maintenance of the polar icebreaker fleet have been underfunded for many years. Deferring long-term maintenance and failing to execute a plan for replacement or refurbishment of the nation's icebreaking ships have placed national interests in the polar regions at risk. The recent transfer of budget authority for the polar icebreaking program by the Office of Management and Budget from the U.S. Coast Guard to the NSF did not address the basic problem of underfunding routine maintenance or providing funds for U.S. Coast Guard non-science icebreaker missions. The transfer has increased management difficulties by spreading management decisions across two agencies and multiple congressional oversight committees.

The NSF now has fiscal control over direct costs associated with the polar icebreaking program, including personnel, training, operations, and maintenance. The NSF is now fiscally responsible and making decisions for missions outside its core mission and its expertise. The U.S. Coast Guard is operating a ship for which it does not have full budget and management control.

The Committee believes that the total set of U.S. Coast Guard icebreaking missions transcends the mission of support to science, despite the fact that the majority of

icebreaker usage at the current time is to support research. The U.S. Coast Guard should have the funds and authority to perform the full range of mission responsibilities in ice-covered waters of the Arctic. This will require resumption of regular patrols of coastal waters and an increased U.S. presence in international Arctic waters by the nation's multi-mission icebreaker fleet.

It is not sufficient to provide funds to only maintain the fleet; it is necessary to provide funds to effectively operate it. The Committee strongly believes that management responsibility should be aligned with management accountability.

When the NSF, NOAA, or another "user" agency employs a U.S. Coast Guard icebreaker to support some directed activity, the user agency should pay incremental operational costs associated with direct mission tasking. This arrangement has worked well for decades, though it would be useful for the financial arrangement to be clarified and reasserted by the Administration. If the U.S. Coast Guard is funded to operate a vessel, then direct tasking reimbursement would typically include the cost of fuel for extended transit beyond patrol, and on-ship engineering and habitation costs that derive from research activities. The Committee encourages the U.S. Coast Guard to invite researchers and educators on planned patrols to conduct science of opportunity. Only the former, direct tasking, should require reimbursement to the U.S. Coast Guard above congressionally appropriated operational funds.

Recommendation #6: The U.S. Coast Guard should be provided sufficient operations and maintenance budget to support an increased, regular, and influential presence in the Arctic. Other agencies should reimburse incremental costs associated with directed mission tasking.

CLARIFY NATIONAL POLICY

The U.S. need for polar icebreaking has been studied several times over the past two decades. The conclusions remain the same. As a nation with citizens in both the Arctic and Antarctic, the United States has a clear obligation to assure the welfare of these citizens and to protect its national interests in the polar regions. The U.S. Coast Guard polar icebreaker fleet is a national asset that is best managed to serve multiple missions.

The last declaration of Presidential-level policy regarding the U.S. requirements for polar icebreaking was a Presidential Report to Congress in 1990. While recognizing the continuing national need for polar icebreaker operations, this report does not adequately address current and future issues.

Immediate policy action is needed for several reasons: wholesale ship obsolescence in the fleet; lack of adequate U.S. Coast Guard capability in the Arctic; increased human presence and economic activity in the Arctic region; and threats to native American communities due to accelerating environmental changes. Clear direction for sustaining icebreaking capabilities needs to be asserted to ensure that the United States does not find itself without adequate polar icebreaking capability in the future as it has in the past and as it does today. If the multi-mission ships are to be used effectively as a national asset, then the agency with the core mission to support the polar icebreaking needs of the nation—the U.S. Coast Guard—must have adequate budgetary

authority and operational control of the fleet. The U.S. Coast Guard's full operational mission in the ice-covered waters of the Arctic needs to be re-affirmed.

Recommendation #7: Polar icebreakers are essential instruments of U.S. national policy in the changing polar regions. To assure adequate national icebreaking capability into the future, a Presidential Decision Directive should be issued to clearly align agency responsibilities and budgetary authorities.

Anita K. Jones is a professor at the University of Virginia. Dr. Jones is a professor at the University of Virginia and chair of the Computer Science Department. From 1993-1997 Dr. Jones served at the U.S. Department of Defense where, as Director of Defense Research and Engineering, she oversaw the department's science and technology program, research laboratories, and the Defense Advanced Research Projects Agency. She received the U.S. Air Force Meritorious Civilian Service Award and a Distinguished Public Service Award. Dr. Jones served as vice chair of the National Science Board and co-chair of the Virginia Research and Technology Advisory Commission. She is a member of the Defense Science Board, the Charles Stark Draper Laboratory Corporation, and the National Research Council Advisory Council for Policy and Global Affairs. She is a fellow of the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers, and the author of 45 papers and two books. Dr. Jones is a member of the National Academy of Engineering.

STATEMENT OF THE HONORABLE FRANK A. LoBIONDO, CHAIRMAN
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION HEARING
ON THE REVIEW OF THE NATIONAL ACADEMY OF SCIENCES ICEBREAKER
REPORT
SEPTEMBER 26, 2006

The Subcommittee is meeting this morning to review the National Academies report on the Coast Guard's polar icebreakers, as well as the needs of the United States for these vessels. The Coast Guard's polar icebreakers are vital to our country's national interests, and Congress must ensure that the capability that we had in the past will be available in the future.

The Coast Guard's involvement in the polar regions began in 1885, when the USS Bear was transferred from the Navy to the Treasury Department for use in the Alaskan Patrol by the U.S. Revenue Marine, an ancestor of the Coast Guard. The BEAR is regarded as the first Coast Guard icebreaking vessel. And like today's Coast Guard icebreakers, the BEAR embodied the concept of the multi-mission ship. It broke ice, rescued shipwrecked mariners, enforced fisheries laws, carried mail, and made hydrographic surveys.

Today's Coast Guard icebreakers are just as important. The United States has citizens and property in the Arctic, and we must continue to be able to protect and support these interests. Further, the area's importance will only increase in the future, with progressively more economic activity. There will be more fishing fleets, cruise ships, and military operations in the area. Certainly, the United States government must have reliable icebreaking vessels that this area will need.

In the Antarctic, the United States must maintain its year-round presence, and the Coast Guard's polar icebreakers play a critical role. The United States must continue to operate on the continent to ensure Antarctica is preserved for peaceful purposes and to provide access to an area vital to our scientific community. The nation must resupply its interests in this area, and this requires ships to bring large quantities of fuel and materials. The Coast Guard's icebreakers have made this possible.

The importance of these regions should not be underestimated. It is very concerning that two of the Coast Guard's three polar icebreakers have reached the end of their 30-year service life. I am particularly troubled by the National Academies' report which concluded that the polar icebreaking fleet has been underfunded for many years, undermining our ability to operate in the polar regions.

I recognize and appreciate the budget constraints the Service and the Department are currently faced with, but I believe it is important for them to develop a realistic plan to ensure this nation continues to have a polar icebreaking capability well in the future.

I thank the witnesses for coming this morning, and I look forward to their testimony.

U. S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2100 Second Street, S.W.
Washington, DC 20593-0001
Staff Symbol: G-ICA
Phone: (202) 366-4280
FAX: (202) 366-7124

DEPARTMENT OF HOMELAND SECURITY

U. S. COAST GUARD

STATEMENT OF

RDML JOSEPH NIMMICH

ON THE

NATIONAL ACADEMY OF SCIENCES REPORT ON FEDERAL ICEBREAKING MISSIONS

BEFORE THE

SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

U. S. HOUSE OF REPRESENTATIVES

SEPTEMBER 26, 2006

Introduction

Good Afternoon Chairman LoBiondo, Congressman Filner, and distinguished members of the Subcommittee. It is my pleasure to appear before you today to discuss Coast Guard efforts supporting national requirements for icebreaking. A robust icebreaking capability is critical to our ability to ensure safety, security and prudent stewardship within our Nation's maritime domain including our national interests in the polar regions.

Background

Significant historical events have been the catalyst that influenced national polar icebreaker policy decisions. These events have included: the purchase of Alaska; World War II; the Cold War; the 1956 International Geophysical Year; the Antarctic Treaty; and the oil crises of the 1970s. Additionally, recent focus on issues such as the 1982 Law of the Sea Convention, increasing world demand for natural resources, changing shipping patterns driven by a global economy, recent severe ice conditions in the Antarctic, and changes in Arctic sea ice have fueled new interest in our national polar icebreaker employment and resource needs.

These recent and developing polar issues, coupled with U.S. interests in both polar regions, mandate an awareness of our national polar missions. In particular, the United States must consider the increasing international initiatives in the Arctic. Thus far, the Arctic has witnessed a growing Chinese polar presence, more frequent and assertive Russian seabed claims, and increasing Canadian claims in the Arctic.

Against this backdrop, the National Research Council's recent report on U.S. polar icebreaker needs addresses the variety of issues we confront when discussing national concerns in the polar regions. As I will cover, the national requirements for polar ice breaking capability must be considered in three areas: the Coast Guard's historic and traditional role in fulfilling direct mission tasking, the Coast Guard's propensity and requirement to support contingency operations, and the future expansion of our sovereign national presence.

Direct Mission Tasking

Since 1947, when Admiral Byrd led a major naval task force to the Antarctic, Coast Guard polar icebreakers have supported interagency missions of the National Science Foundation, the Department of Defense, the Department of Commerce's National Oceanographic and Atmospheric Administration, and the Department of State. These traditional direct mission tasks include such diverse activities as re-supplying remote polar stations, conducting scientific research at both poles, ensuring that legitimate maritime traffic has access to and mobility within the polar regions, and leveraging a reciprocity agreement that ensures access to Canadian polar icebreaking resources.

Contingency Operations

The Coast Guard combines the capability of our polar icebreakers to support polar research and national security missions with traditional Coast Guard missions, as the polar icebreakers are often the closest Coast Guard ships available to respond to crisis in the remote areas where they operate. With increased traffic seeking natural resources and offering broader access to the regions, there has been an increased need for the capabilities to conduct the enforcement of laws and treaties, marine environmental protection and response, search and rescue and other services, provided by a national vessel of opportunity. For example in 1998, the Military Sealift Command chartered cargo ship GREEN WAVE suffered a major engine explosion having just cleared the ice off Antarctica following its re-supply of United States facilities at McMurdo Sound. Adrift alone for two days, the GREEN WAVE was assisted by the cutter POLAR STAR, which successfully towed the crippled vessel on a two-week, fifteen-hundred mile, trip from Antarctica to the nearest commercial assistance in New Zealand. Similarly, in July of 2004 the cutter HEALY responded to a report of four overdue walrus hunters lost in a remote area of northern Alaska and found the hunters, all between the ages of fifteen and twenty, onboard a disabled skiff that had been adrift in the ice for over three days. Later in the same patrol, HEALY again conducted search and rescue operations to locate and rescue an eighty-one year old mariner in distress. Additionally, in March of 2005 the cutter POLAR STAR, returning from a six-month deployment in Antarctica, responded to the devastation Cyclone Olaf wrought in the Pacific by assisting the Federal Emergency Management Agency (FEMA) and delivering over 70,000 pounds of relief supplies to the devastated American Samoa, Islands of Tau and Ofu. All of these capabilities support the existing 1990 Presidential Determination, which stated that "given the vast distances involved and the significant cost

of operating icebreakers, they are most efficiently utilized by combining operational and research missions in any given deployment whenever possible."

Sovereign Presence

Congress has granted the Coast Guard wide-ranging statutory authorities consistent with it's multi-faceted missions so we can provide a sovereign, as well as scientific, presence in the Polar Regions. These authorities reside in a variety of statutory and regulatory titles and reflect the spectrum of the Coast Guard enforcement activities as well as our historical evolution as both an armed force and a Federal maritime law enforcement agency. Taken together, these diverse authorities create a unique maritime capability for the nation; even to our farthest reaches. The ability of the United States to exert influence and support its national polar interests depend on a national presence and continuing engagement, even if this is manifested by seemingly unrelated routine activities. Specifically, the Arctic Ocean lacks an agreement similar to the Antarctic Treaty, which guarantees political and environmental stability in the southern regions. While the U.S. Antarctic program requires polar icebreakers to support land-based stations, our national Arctic policy requires a maritime presence to guarantee our security interests, enforce United States law, and influence the international foreign policy process. A recent U.S. Geological Survey report concluded that one-fourth of the world's energy reserves lie north of the Arctic Circle. And as the 1982 Convention on the Law of the Sea and related international claims to the Arctic Ocean basin evolve, United States interests will require an active and increasing presence in the Arctic.

Fleet Condition

Since the polar icebreaker fleet was reduced from eight vessels during the 1960's to three vessels today, operational time on our polar icebreakers has been at a premium and almost exclusively devoted to the direct mission tasking from other agencies. The Coast Guard polar icebreaker fleet currently consists of the cutters HEALY, POLAR SEA, and POLAR STAR. Our newest, the HEALY, was commissioned in 1999 and has been actively supporting annual Arctic research deployments since. The other two, the cutters POLAR SEA and POLAR STAR were both built and commissioned in the 1970's and are nearly thirty years in age. Recently the POLAR STAR was placed in a caretaker status pier-side in Seattle.

Due to the harsh and remote polar environment and operating methods and conditions for polar icebreakers, all of these vessels require durable marine engineering features in order to allow them to withstand years of colliding with sea ice (typically having the characteristics of concrete, found twenty feet thick or more, and at temperatures as low as negative 60°F). The unique environment in which polar icebreakers operate, coupled with their significant operating requirements, make the vessels inherently costly to operate and maintain.

Conclusion

In recent years, material degradation to two of our aging heavy icebreakers has caused doubt regarding the deployment of the ships to the Arctic and Antarctic.

The results of the National Research Council study on polar icebreakers will help the Administration and Congress continue to define policy for the polar icebreaker program.

Thank you for the opportunity to testify before you today. I will be happy to answer any questions you may have.

Testimony of
Mr. Mead Treadwell, Chairman
U.S. Arctic Research Commission

National Academies of Science report on Federal icebreaking missions

Before the
House Subcommittee on Coast Guard and Maritime Transportation

September 26, 2006

Thank you, Mr. Chairman, for the opportunity to testify before the Subcommittee concerning the National Academies of Science report on Federal icebreaking missions and on the views of U.S. Arctic Research Commission (USARC) that address this important matter.

My name is Mead Treadwell and I am from Anchorage, Alaska. I have been a member of the U.S. Arctic Research Commission since 2001, and in August of this year, I was designated by President Bush to serve a three-year term as Chairman. I am a Senior Fellow at the Institute of the North, and Chairman and Chief Executive Officer of Venture Ad Astra, an Anchorage-based firm developing geospatial positioning and imaging technologies.

Before presenting my testimony, I'd like to dedicate my remarks to the two crew members of Coast Guard icebreaker *Healy* who died this summer in the conduct of Arctic Research, and to their families.

Before outlining the USARC's position on the importance of maintaining a fleet of federal icebreaking ships to the nation, I would like to compliment the National Academies of Science, and the Polar Research and Marine Boards, in particular, for their fine efforts in conducting this study on behalf of the nation. As this report has just been publicly released, we will require more time to study it, but based on our preliminary understanding, the USARC, which worked closely with the Polar Research Board in developing this study, supports its conclusions.

We also compliment the Coast Guard for conducting their study and for recognizing that such a federal fleet is essential. Many of their conclusions are in sync with those in National Academies report.

I am addressing you because the US is a polar country and we have been since 1867, and because we are a leading nation in Arctic research. The U.S. Arctic Research Commission was created in response to the passage of the Arctic Research and Policy Act of 1984. The primary duty of the Commission is to develop and recommend an integrated national Arctic research policy.

USARC cooperates with the Interagency Arctic Research Policy Committee to establish a national Arctic research program plan to implement the policy. In addition, the USARC facilitates cooperation among the Federal Government and state and local governments with respect to Arctic research; reviews Federal research programs in the Arctic and recommends improvements in coordination among programs; recommends methods to improve logistical planning and support for Arctic research; recommends methods for improving efficient sharing and dissemination of data and information about the Arctic among interested public and private institutions; cooperates with the Governor of the State of Alaska and with agencies and organizations of that State which the Governor may designate with respect to the formulation of Arctic research policy; recommends to the Interagency Committee the means for developing international scientific cooperation in the Arctic; and publishes a biennial statement of goals and objectives with respect to Arctic research to guide the Interagency Committee.

With respect to icebreakers and the Federal icebreaking mission, USARC works with other agencies, and the Arctic statute reads, "The Office of Management and Budget shall seek to facilitate planning for the design, procurement, maintenance, deployment, and operations of icebreakers needed to provide a platform for Arctic research by allocating all funds necessary to support icebreaking operations, except for recurring incremental costs associated with specific projects, to the Coast Guard."

Over the past several years, the USARC has communicated to the President (see letter attached), to Congress, and to other entities, including the National Academies, the importance of maintaining a fleet of icebreaking vessels to the U.S., and is one of only eight Arctic nations, including Russia, Canada, Sweden, Norway, Denmark (Greenland), Iceland, and Finland. Alaska is our nation's Arctic territory, and the gateway to the high north.

While scientific research may be our particular purview, we also recognize that such a fleet is a vital part of the nation's strategic presence in the polar regions.

The Arctic environment is changing rapidly, as reported daily in the global press. Climate change is presenting both challenges and opportunities, such as improved prospects for research, enhanced access to natural resources, and favorable circumstances for marine transportation via previously ice-infested passageways and polar routes. These changes are not going unnoticed by our fellow Arctic nations, and activities ranging from scientific research to commercial development are increasing apace.

I would like to make these 4 specific points regarding the necessity of a Federal icebreaker fleet.

1. **Vital for scientific research**. Because icebreakers conduct operations in ice-covered waters that no other ships can perform, they are essential to the support of research in high latitudes, not only as research platforms, but also to enable access to and support of research facilities locked within permanent ice pack of the polar seas. Because the Coast Guard icebreakers are aging, the National Science Foundation has had little choice but to charter a Russian commercial icebreaker for Antarctic work, and a Swedish icebreaker is likely to be leased by NSF next year for work at both poles. Shouldn't a US federal icebreaker fleet be supporting our research and polar interests?

2. **National presence in polar waters**. US Coast Guard icebreakers maintain our national presence in both the Arctic and the Antarctic in support of the US policy in the Antarctic and our standing in the Antarctic Treaty organizations. Canada's Prime Minister, Stephen Harper, has become particularly vocal about sovereignty issues. He has proposed the purchase of three new heavy icebreakers to be based in a new port near Iqualuit, and the addition of 500 personnel in Canada's north. In a speech in Winnipeg last December 22, he said, "As Prime Minister, I will make it plain to foreign governments – including the United States – that naval vessels traveling in Canadian waters will require the consent of the government of Canada." (from "Breaking the Ice on Canada-U.S. Arctic Co-operation, by Franklyn Griffiths, *Globe and Mail*, February 22, 2006). We also need to consider our domestic waters in the great state of Alaska. Alaska's coastline constitutes roughly half of the nation's total. Enforcing the nation's laws and protecting the marine environment requires polar icebreakers. We also have a growing need for an oil spill response system in the Arctic, which requires icebreaker support.

3. **Marine access and shipping is increasing.** As waterways in the Arctic open up, due to the melting and retreat of sea ice, support of Arctic transportation (which shortens shipping distances and times, and are thus of significant economic interest) will become more important as will the nation's need to maintain freedom of navigation in these regions. As Arctic sea ice disappears during the summer months over the next 50 years, marine access will open up, and routes across the polar ocean could shorten the distance between Europe and Asia for commercial shipping. With this potential increase in Arctic shipping comes a greater US responsibility for environmental protection, search and rescue, navigation, safety, and overall security of the Bering Strait region and Alaska's coastal seas.

4. **Claims to extend US sovereignty in the Arctic.** Whether or not the US accedes to the Convention on the Law of the Sea, we must conduct surveys of our nation's extended continental shelf in order to support our claims of sovereignty. Many of these regions are rich in natural resources, and if they are to be developed, we will need to know definitively if these areas are part of the United States. Many regions requiring surveys are adjacent to Alaska, in ice-infested waters, accessible by icebreakers.

Of all the world's oceans, the Arctic Ocean is the last frontier, a *mare incognitum*. It's a demanding place, remote, and operations in this region are expensive. Nevertheless, due to a rapidly changing environment, the Arctic is a region of great opportunity. Access is improving, and will continue to do so. Nine out of ten people in the world live on the continents that surround the Arctic Ocean, which means this area will not go unnoticed in the 21st century.

An icebreaker fleet is a national asset and is an important element of broad national interest. A fleet is required to meet national needs in scientific research, national and homeland security, sustainable use of resources, maritime activity, and sovereignty. NSF's Dr. Bement cites a daily operational cost of $100,000 for icebreaker *Healy*. This should be a challenge to all involved: what combination of crewing configuration, long-term maintenance, cost sharing on missions, and other factors may be called into play to reduce this figure?

In summary, the US cannot meet these needs with flags, rhetoric, outsourcing abroad, and public affairs campaigns. We require US ships in the sea and the missions they accomplish. Most of the vessels in the existing fleet are near, or at the end of their lifespan and refurbishment is not prudent. A new fleet of polar class icebreakers is required, and it must be a Federal fleet rather than one created entirely through private enterprise.

Thank you for the opportunity to speak with you today. I would be pleased to address any questions you may have.

UNITED STATES ARCTIC RESEARCH COMMISSION

The Honorable George W. Bush
President of the United States
The White House
1600 Pennsylvania Avenue, N.W.
Washington, DC, 20500

9 February 2005
USARC 05-07

Dear President Bush,

The icebreaker fleet operated by the US Coast Guard is a vital part of the nation's strategic presence in the Polar Regions. These ships conduct operations in the ice covered regions of the world's oceans that no other United States ships can perform. The Coast Guard Polar Icebreakers are essential to the support of research in nigh latitudes, not only as research platforms, but to allow the support of research facilities inside the permanent ice pack of the polar seas. These ships also maintain our national presence in both the Arctic and the Antarctic including supporting the US policy in the Antarctic and our standing in the Antarctic Treaty organizations. As marine access changes in the Arctic, the support of Arctic transportation will become more important as will the nation's need to maintain freedom of navigation in these regions.

The capabilities of the Coast Guard icebreakers are essential for the surveys necessary for a US claim to extensions of our sovereignty in the Arctic under Article 76 of the UN Convention on the Law of the Sea and to enforce any requirements or regulations which the nation may decide to implement over this new national territory. Similarly, the Alaskan coastline is roughly half of the coastline of the entire country but cannot be properly safeguarded without the ability to operate in the region, an ability possessed only by Coast Guard icebreakers.

The Arctic environment is becoming less remote and future development activities will require the ability to respond at sea to such varied responsibilities as oil spill clean up and fisheries enforcement in the Arctic. In addition increasing access to the Arctic requires the capability for classic Coast Guard roles such as search and rescue and to ensure safety at sea.

Recent developments in the support of the Coast Guard's icebreaker fleet have caused concern within the U.S. Arctic Research Commission. We respectfully request that the future availability of the nation's capability for marine operations be carefully monitored and secured in order to preserve these essential capabilities.

Respectfully,

George B. Newton
Chair
US Arctic Research Commission

4350 NORTH FAIRFAX DRIVE, STE. 510, ARLINGTON, VIRGINIA 22203
703-525-0111 FAX 703-525-0114

STATEMENT OF THE HONORABLE DON YOUNG
AT THE
COAST GUARD AND MARITIME TRANSPORTATION
SUBCOMMITTEE HEARING

NATIONAL ACADEMY OF SCIENCES
ICEBREAKING REPORT

SEPTEMBER 26, 2006

I WELCOME THE WITNESSES TODAY, AND I LOOK FORWARD TO HEARING THEIR TESTIMONY ABOUT THE COAST GUARD'S POLAR ICEBREAKING FLEET, WHICH IS VITAL TO THE NATIONAL INTERESTS OF THE UNITED STATES.

AS THE REPRESENTATIVE FOR ALL OF ALASKA, I AM PARTICULARLY AWARE OF ITS IMPORTANCE TO THE PEOPLE OF MY STATE, NOW AND IN THE FUTURE.

THE UNITED STATES MUST BE ACTIVE IN THE ARCTIC REGION TO PROTECT AND SUPPORT ITS INTERESTS. THIS REQUIRES VESSELS THAT CAN ENSURE ACCESS AND DO MISSIONS IN ADDITION TO RESEARCH, LIKE SEARCH AND RESCUE, NATURAL RESOURCES PROTECTION, ENFORCEMENT OF TREATIES, AND NATIONAL DEFENSE.

THE COAST GUARD'S POLAR ICEBREAKERS ARE THE ONLY U.S. GOVERNMENT ASSET CAPABLE OF THESE MISSIONS. AND THE COAST GUARD IS THE BEST AGENCY TO OPERATE THEM BECAUSE OF THEIR MARITIME EXPERTISE, TRAINING, AND MILITARY DISCLIPLINE.

I AM VERY CONCERNED ABOUT THE DEGENERATION OF THE COAST GUARD'S POLAR ICEBREAKER PROGRAM.

WE MUST ADDRESS THE IMPORTANT POINTS MADE IN THIS STUDY, AND I STRONGLY URGE MY COLLEAGES TO SUPPORT THIS PROGRAM, INCLUDING REFURBISHING AND ACQUIRING NEW POLAR ICEBREAKERS.

I LOOK FORWARD TO HEARING FROM THE WITNESSES.

THANK YOU, MR. CHAIRMAN.

○